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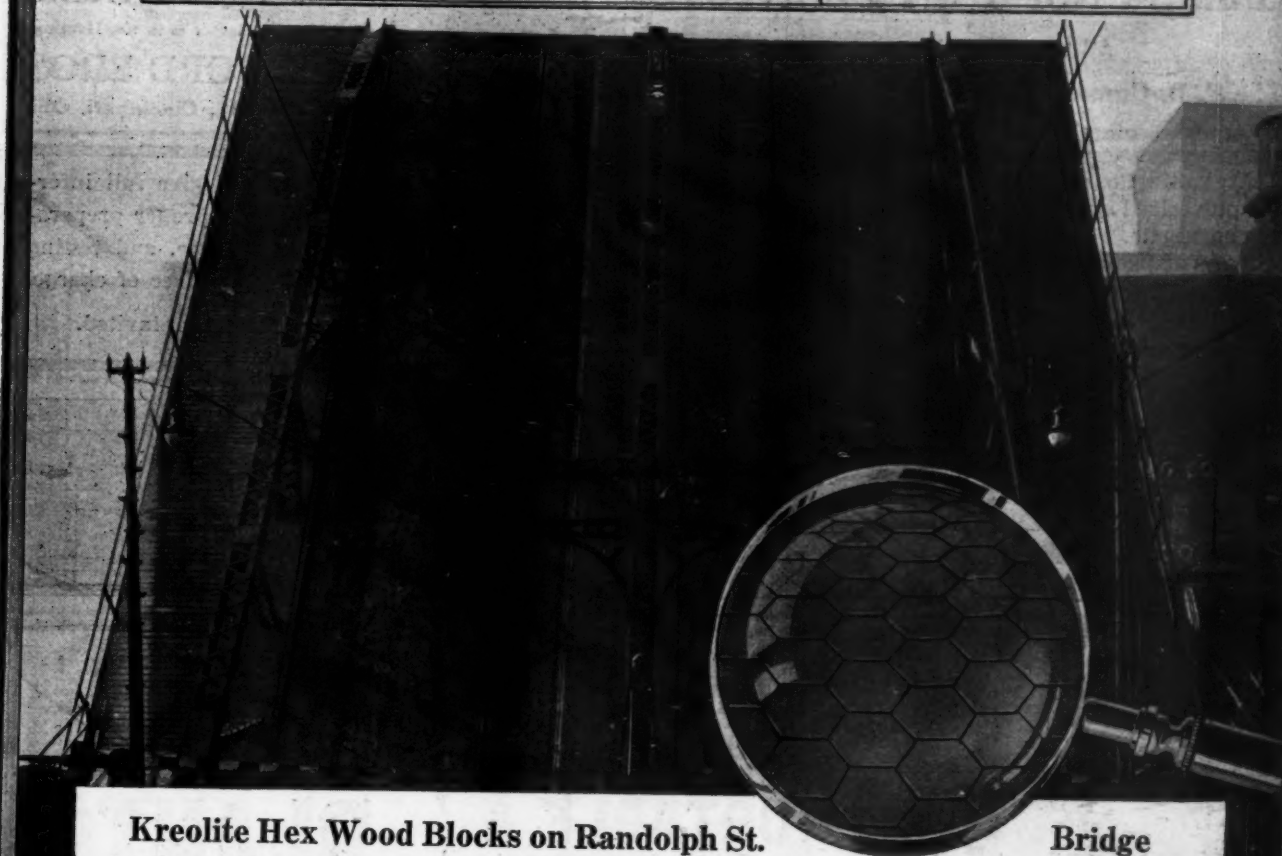
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Municipal Journal

Volume XLIV.

NEW YORK, MARCH 23, 1918

No. 12

CHLORINATION AT SAN DIEGO*

Liquid Chlorine Entirely Eliminates Colon Bacillus from Water Supply—No Typhoid Traceable to Supply—Difficulties Experienced in Applying Chlorine to Water Supply and Methods of Overcoming Them.

By WILBUR H. JUDY.†

The increasing use of liquid chlorine as a sterilizing agent for water supply will doubtless develop many interesting problems according to varying local conditions to be met in the different plants. As there seems to be more or less trouble encountered with nearly every sterilizing apparatus installation, it may be interesting to note some difficulties which developed in the chlorination plant of the city of San Diego, California, the methods used to overcome them and the results obtained.

The first chlorinator installed by the city was a solution feed machine to operate against a back pressure of twenty-five pounds maximum. This machine was located to inject chlorine solution into the effluent from pressure filters and had a rated capacity of thirty ounces of chlorine per hour. Considerable trouble developed in the check valve, which allowed water to back up into the control plate. Each time this happened the apparatus was taken down and thoroughly dried out. One of the main sources of check-valve trouble was filter washing, which caused a surge in the effluent main that increased the pressure several pounds.

A second chlorinator, duplicate of the first except that it is a gravity feed plant, was installed at a small reservoir in the city to treat water pumped from the San Diego river in cases of emergencies. This plant can also be used to chlorinate water from the impounding system when the consumption is low. By the use of this plant, when the first one at Otay was out of order, a standard certifiable water was delivered to consumers.

As the gravity feed plant gave excellent service with practically no trouble, it was decided to change the pressure plant at Otay into a gravity feed type. To overcome the back pressure in the effluent main, it was necessary to have the plant at an elevation of at least sixty feet higher than the main. This was obtained by moving the plant to a point on the hill back of the filter house. (Plant layout shown in Fig. 2.)

After installing the apparatus in the new location and operating for a few days, the bacteriological analyses began to give erratic results, showing faulty operation of the chlorinator. Upon careful examination, the theory was advanced that during filter washing the fluctuation in effluent pressure caused an intermittent flow of chlorine solution. As the chlorine solution fed by gravity, the solution column height in the one-inch rubber main

was governed by the effluent pressure. During filter washing, as the effluent pressure dropped, the solution column lowered correspondingly, and again when the effluent pressure increased the solution column would back up to a height corresponding to the pressure increase. In this manner an intermittent flow of solution was injected into the effluent main. To prove this theory a series of samples was taken at a point about 500 feet from the point of solution injection. From the rate of flow at the time of sampling, a calculation was made of the time required for water to flow from the point of chlorination to the sampling cock. Sample A was taken before washing was started, B, C, and E were taken during times theoretically unchlorinated water was passing, and sample D was taken during a time theoretically treated water was passing. The analyses of these samples proved the theory to be correct (see table I). Consequently a device was designed to regulate the solution feed. The device does not actually regulate the solution feed, but merely insures a positive flow in the solution main at all times.

The regulator, Fig. 1, consists simply of a small wooden tank, 10 inches by 10 inches by 3 feet, connected at the top with the high-pressure, fresh-water service, the flow of water being regulated by a float and ball cock. The bottom of this tank is connected with the chlorine solution main, by means of rubber pipe and fittings, at a point just outside of the chlorine house. Between filter washings the water level in the tank is governed by the position of the rubber cock, Fig. 1, which is on the discharge end of the solution main above the effluent pipe. The position of the cock varies according to the flow in the effluent. A large flow produces a high back-pressure, thus requiring a larger opening of the cock to keep the water in the regulating tank at point "A" than do a lower flow and smaller back-pressure.

With the cock set at point 4 (for about a ten-million-gallon flow) and the tank water level at "A," filter washing is started. The pressure in the effluent main drops about eight pounds in five minutes, which causes an increased flow in the solution main. As the flow of water into the absorption tower must remain constant, the increase in flow is taken care of by the fresh water tank float, which opens the ball cock as soon as the flow increases enough to lower the water level in the tank. In this way the head on the solution main never varies more than from "A" to "B," one inch. When the wash-water pump is stopped and the unit cut back into service, the

*For information concerning this plant, see Municipal Journal for November 30, 1916, and March 29, 1917.

†Engineer, Operating Department, San Diego, Cal.

effluent pressure increases eight or ten pounds in five minutes, but as the head on the solution main remains practically constant during washing there is a positive flow of solution at all times.

Theoretically this device is not perfect, because during increased flow in the solution main fresh water is added to the solution from the absorption tower, thus partially filling the rubber main with a weaker solution, which is discharged during the pressure increase in the effluent main. Practically, however, it has proven to be very efficient because it has overcome the problem of continuous flow from the solution main during all stages of filter washing.

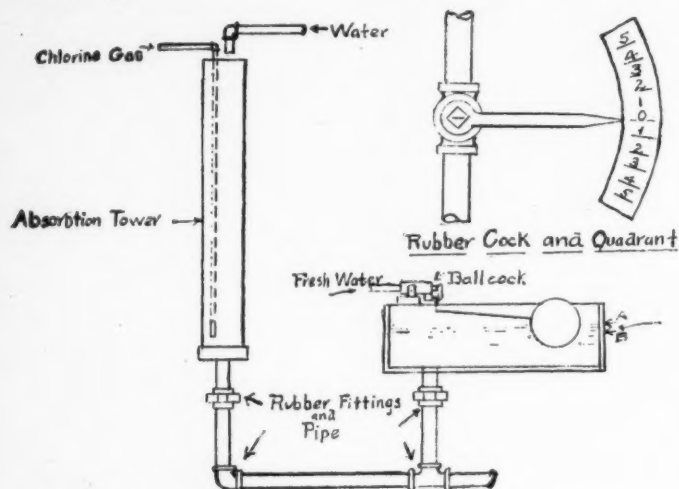


FIG. 1.—DETAILS OF SOLUTION FEED REGULATOR.

Table I gives the results of bacteriological analyses of samples taken in two series, one before the device was installed and the other after the installation. The first series, A, B, C, D and E, was taken before, and the second series, A', B', C', D' and E', was taken after the installation of the regulator. Both series were taken at the same relative periods of filter washings as marked on the pressure curve. Samples A and A' were taken before washing was started in each case.

TABLE I.										
Sample	A	A'	B	B'	C	C'	D	D'	E	E'
Total count.....	17	4	1230	7	560	4	26	4	2250	6
B. Coli in .1 cc	-	-	-	-	-	-	-	-	+	-
B. Coli in 1.0 cc	-	-	-	-	+	-	-	-	+	-
B. Coli in 10.0 cc	-	-	-	-	+	-	+	-	+	-

These results show the effectiveness of the device and furthermore, at the time of writing, the first month of 1918 has passed without any signs of B. coli in the water as delivered to consumers and with an average total count of 16. Another important feature is the fact that, since the installation of the device, the chlorine feed has been reduced from four pounds to two pounds per million gallons of water.

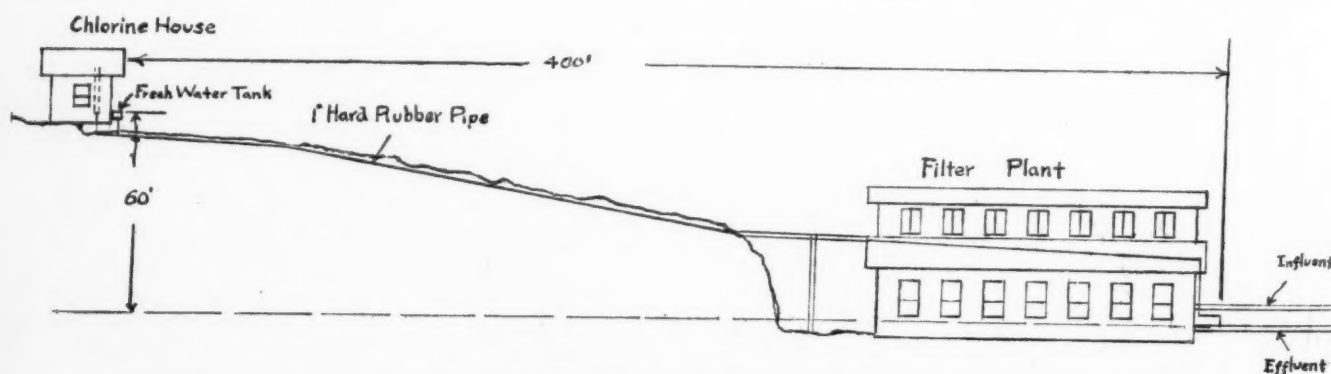


FIG. 2.—LAYOUT OF FILTER HOUSE AND CHLORINE HOUSE, AFTER MOVING LATTER.

It is also interesting to note that during the year 1917 there were 57 cases of typhoid in the city of San Diego, 42 of which were directly traceable to contaminated oysters and the remaining 15 cases were imported, none being traceable to water.

SEWAGE POLLUTION OF BOSTON HARBOR

Report of State Commission Shows Gradual Increase—Acid Treatment of Sewage Not Recommended, Chiefly for Financial Reasons.

Last year a joint committee was appointed by the General Court of Massachusetts, to report upon the pollution of Boston Harbor by sewage discharged into it, and "whether there is any practical, economical way of removing from the sewage any merchantable products contained therein." This committee, consisting of the chairman of the Metropolitan Water & Sewerage Board, the state health commissioner, and the commissioner of Public Works of Boston, has made its report, the general facts and conclusions of which are given below.

There are three principal sewage outlets into Boston Harbor, in addition to small local sewers and sewage brought in by streams. These three outlets have been in operation for a number of years, but the one which formerly discharged at low-water level near Deer Island light has been extended to deep water and the sewage is now discharged at 14 different outlets from a conduit extending for a distance of 126 feet along the bottom of the sea at depths of from 32 to 53 feet at low-tide, the outlets being located in a line at right angles to the strong tidal current that passes this point. This new outlet was first put into service in November, 1917, and full information as to the change in conditions effected by it has not been obtained, but such as is available indicates a very great improvement. The sewage that is received at the Calf Pasture pumping station is pumped to settling tanks, then passes through an inverted siphon under Dorchester bay to reservoirs at Moon Island, where it is stored during the incoming tide and discharged during the second and third hours of the outgoing tide. By the time it is discharged, this sewage is so stale that it has become very much decomposed and putrefied, with a resulting more offensive odor. The discharge at this outlet on calm days in summer covers 600 to 700 acres of the harbor surface, while a thin film of oily sleek extends to greater distances.

A considerable pollution of the harbor undoubtedly is caused by storm overflows from combined sewers, at most of which outlets sewage overflows during every considerable storm, and from many of which there is also considerable leakage. Change from the combined to the separate system of carrying sewage and storm water has already been begun in parts of the district tribu-

tary to the harbor and will, if continued, eventually remove this source of pollution.

The condition of the harbor due to sewage discharge at Moon island is believed to have changed but little since the 1915 report of the State Department of Health, although at this, as at every outlet, the amount of polluting matter has increased. The Deer island outlet has already been referred to. The third outlet at Nut island discharges through two outfall sewers, one terminating one mile north of the island and the other 1,500 feet east of it; the former in 27 feet of water and the latter in 30 feet. Analyses of ammonias in water taken at various points show that, except within a distance of about 1,400 feet from the outlet, the quantity of free and albuminoid ammonia in the water at the surface and at points 20 feet below the surface is no greater than is found in the harbor waters at points far removed from sewer outlets.

Ammonia analyses of water taken at various points in the harbor during 1913 were compared by the committee with similar analyses taken in 1905; and this showed that during the intervening eight years the amount of free ammonia in the inner harbor during ebb-tide had increased from 0.34 parts per million to 0.43, and during the flood-tide from 0.25 to 0.41. The amount of pollution decreased with the distance from the inner harbor, and in the outer harbor the free ammonia found during the two years in question was 0.11 and 0.18 respectively on the ebb-tide and 0.06 and 0.10 on the flood. While conditions do not appear to have reached a serious stage in the harbor as yet, and while the increase in ammonia has not been great, it nevertheless appears that the growing population about the shores of the harbor is having an increased effect upon quality of the water.

ACID TREATMENT OF SEWAGE.

More up-to-date and more interesting was the report of the committee with regard to the removal of merchantable products from the sewage. Concerning this, the committee reported:

"Normal domestic sewage of average strength contains, speaking broadly, a considerable amount of fatty matter and nitrogen and a small amount of potash. The recovery of these materials by a method which would be commercially successful has long been desired and actively and persistently sought by expert chemists and engineers in England, France and Germany, and to some extent in this country. Up to the present time, however, no process has been found that would adequately and satisfactorily solve this problem unless during the present war workers in Germany along these lines, in their efforts to save and supply grease to the country, have perfected such a process. Of this we have no knowledge, however.

"Studies of the literature on the subject, and correspondence during the past year with prominent English engineers and chemists having charge of large municipal works for the disposal of sewage much richer in valuable constituents than that emptied into Boston Harbor, have shown that at only a few places in England is any attempt made to recover grease from domestic sewage, and at none is it as yet an assured commercial success. At Bradford, Leeds, Huddersfield, Oldham, Norwich and other places in England plants are operated for the recovery of grease and sludge-cake from the municipal sewage, but at most or all of these cities this sewage contains wastes from wool-scouring establishments. The practical results of each are probably fairly summarized in a statement from the Leeds authorities, as follows:

"Progress already made in this direction shows that in time it will be possible by artificial processes to get rid of all sludge without causing any nuisance, and make sufficient by the sale of by-products at least to pay the full cost of disposal.

"In Germany, before the war, the various plants erected for this purpose had one after the other been pronounced failures and abandoned. Moreover, when we consider the extreme reluctance of woolen manufacturers, wool-scourers, etc., up to the present time of scarcity of grease and potash, to erect plants for the recovery of these matters undoubtedly present in large amounts in waste wool-scouring liquor, the commercial failure of plants for their recovery from domestic sewage is not to be wondered at.

"For many years the State Department of Health has made studies of wool-scouring waste in Massachusetts and of its valuable constituents, and has also made studies in regard to the fatty matters, nitrogen, etc., in domestic sewage, and in regard to the recovery of these matters from each liquor. Observation in regard to wool scouring wastes, especially during the past ten years, have been made at many of the plants in the state where wool is scoured, but the most complete studies by the department have been made at Lawrence. At Lawrence approximately from 75,000,000 to 100,000,000 pounds of wool are scoured in a normal year's operation of the mills.

"In 1910, 1911 and 1912 the State Department of Health made, by direction of the Legislature, extensive studies of the sanitary condition of the Merrimack river, and this study included many measurements of the volume of waste wool liquor produced at Lawrence and entering this river, and a large amount of analytical work to determine the character of these wastes, especially as to the amount of grease, potash and nitrogen present. The results of these studies were given in a report (House, No. 2050) made in 1913, entitled 'Report of the State Board of Health upon the Sanitary Condition of the Merrimack River.'

A table is given in the report that shows the volume per day of wool-scouring liquor, etc., entering the Merrimack river at Lawrence, and the amounts of fats, nitrogen, and potash present in this liquor.

"The table shows that in 1910, for example, the average volume of output from the first and second bowls of the wool-scouring machines at all of the wool-scouring plants of the city amounted to 211,000 gallons a day and that this volume of liquor contained on an average 29,000 pounds of fatty matters, 14,000 pounds of potash and 2,200 pounds of nitrogen; that is, each gallon of liquor contained .14 pound of fats, .07 pound of potash and .01 pound of nitrogen. Notwithstanding the large amount of valuable materials found in this liquor, however, the department was not able at that time to persuade the manufacturing concerns of the city to erect a suitable plant or plants for the recovery of these matters.

"At the present time, as there is only a small available supply of potash and grease in the country on account of the war, and because of the greatly enhanced price of each, two companies from outside the city are taking the richest wastes from nearly all the mill plants in Lawrence, and we are informed are making some profit. Plants for the recovery of grease from wool waste are also in successful operation at three or four other places in Massachusetts.

"One of the companies at Lawrence recovers both fatty matters and potash, while the plants of the other company are constructed to recover fatty matters only, these fatty matters being worked up into lanolin, etc. These various recovery plants treat approximately 2,000,000 gallons of the richest wastes each month, or about 80,000 gallons a day, taking, however, only the wastes from the first bowl of each wool-scouring plant. It might be said here that in the scouring of wool, the wool moves in one direction through a set of bowls containing the cleansing liquors, and the liquor in the other direction, so that the first bowl in which the wool is first immersed

contains always the strongest liquor; that is, the liquor containing the most fats, potash, nitrogen, etc."

During 1917, work was carried on to ascertain the amounts of fatty matters, nitrogen, etc., in the sewage entering the harbor from the three outlets. Experiments were conducted to determine the total average volume of sludge and fatty matters settling out from the sewage in a few hours under normal conditions, and also the volume of such matters settling out when the sewage was acidified by means of SO_2 (the Miles acid process).

The amount of fatty matters varied from an average of 226 pounds per million gallons in the sewage from Peddock's Island outlet to 541 pounds in that from Deer Island light; the nitrogen ranging from an average of 27 pounds in the former to 52 pounds in the latter. These were the amounts found when the sewage was acidified with 818 and 1,513 pounds of SO_2 per million gallons, respectively; which amount of sewage was in excess of the amounts actually required for the reaction desired. Potash was found in the sewage in only negligible quantities and could not be recovered. These showed that while the Lawrence wool-scouring liquor contained per gallon 0.14 pound of fatty matter, 0.07 of potash and 0.01 of nitrogen, the strongest Boston sewage contained 0.0006 pound of fatty matter, a very small amount of organic nitrogen and practically no potash.

Without attempting to criticise the figures given by Robt. Spurr Weston and E. S. Dorr concerning cost of erecting and operating a plant for carrying on the Miles acid process, the committee states that these figures were based on estimates and not upon any actual data from construction of plants for the treatment of domestic sewage or the cost of operation of such plants. Taking

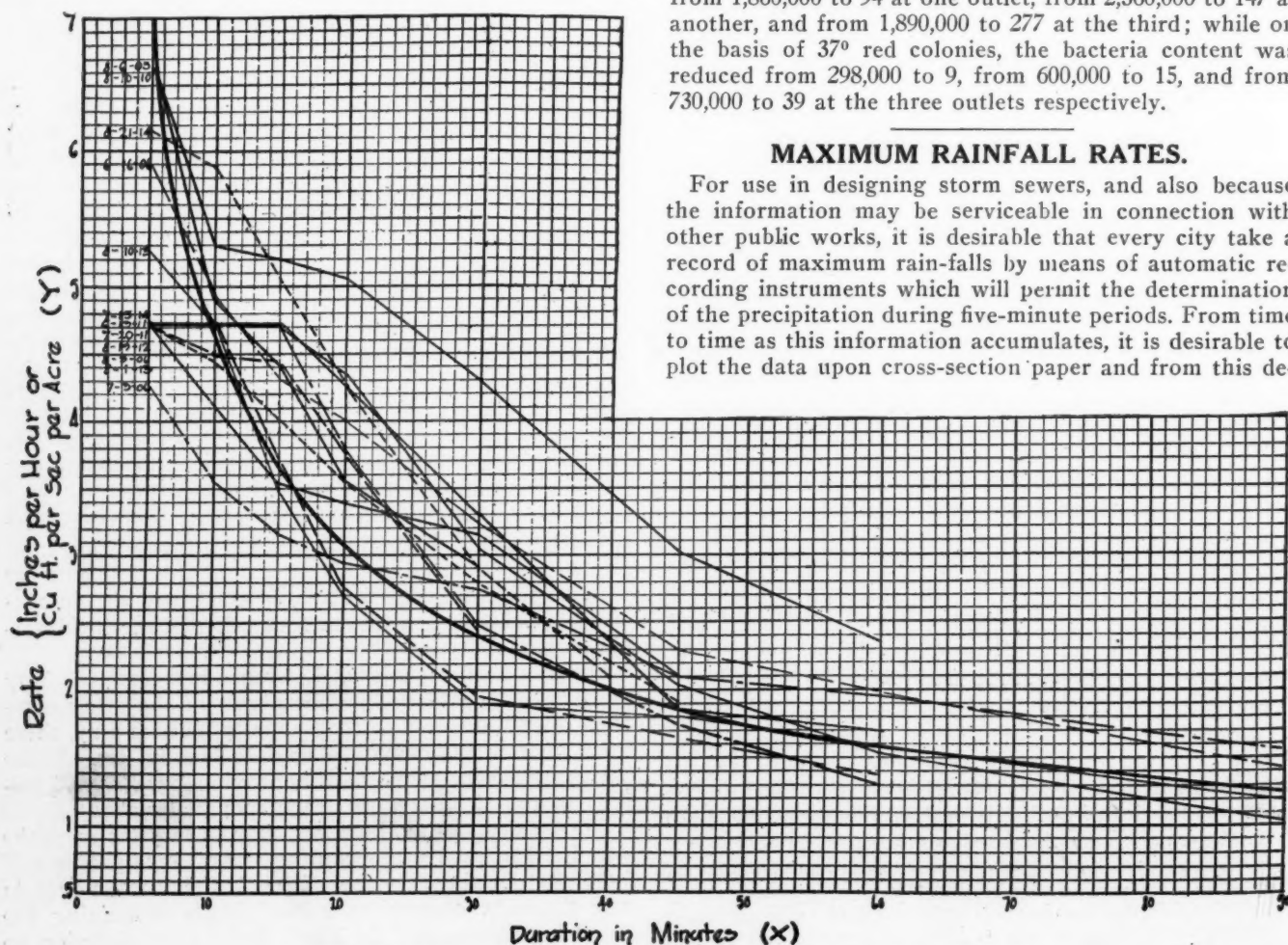
into consideration, however, "the commercial failure of practically all plants abroad when constructed and operated for the purpose of recovering valuable materials from domestic sewage, and the great reluctance with which manufacturers enter into the business of recovering such materials from rich wool-scouring liquor containing probably at the least estimate 400 times as much of value as domestic sewage," the committee did not feel justified in recommending that this process be adopted by Boston or the metropolitan sewerage district. "Extended experiments and investigations on a large and practical scale would first be necessary for the accumulation of any reliable data in regard to outlay in construction, cost of operation and income to be obtained from such works."

Another argument offered in favor of the Miles acid process is the greatly improved character of the effluent. Regarding this, the committee concluded from its experiments that, while organic matter in the sewage can be reduced from 30 to 40 per cent by the acid treatment, it is reduced to almost the same extent by sedimentation without the use of acid. Seventy-five per cent as much sludge and fatty matters were obtained by sedimentation alone as by acidification followed by sedimentation. "The question naturally arises, then, is it worth while to spend approximately \$6 for SO_2 for each ton of sludge produced, if this increases the amount of sludge and grease only 25 per cent. Acidification of the concentrated sludge at a much smaller cost could be carried on in order to crack the grease for recovery."

There undoubtedly was a very great improvement from the point of view of bacterial content. On the basis of 20° bacteria, acidification reduced the bacteria content from 1,860,000 to 94 at one outlet, from 2,360,000 to 147 at another, and from 1,890,000 to 277 at the third; while on the basis of 37° red colonies, the bacteria content was reduced from 298,000 to 9, from 600,000 to 15, and from 730,000 to 39 at the three outlets respectively.

MAXIMUM RAINFALL RATES.

For use in designing storm sewers, and also because the information may be serviceable in connection with other public works, it is desirable that every city take a record of maximum rain-falls by means of automatic recording instruments which will permit the determination of the precipitation during five-minute periods. From time to time as this information accumulates, it is desirable to plot the data upon cross-section paper and from this de-



RELATION BETWEEN INTENSITY AND DURATION OF RAINFALL.
Curves show the 13 most severe storms during the years 1905 to 1914.

termine a rain-fall curve which can be used for determining the maximum rate of precipitation which needs to be considered for any given period of time. Most of the large cities have done this.

In the annual report of the Bureau of Surveys of Philadelphia is given such a curve derived from the records of that city. Since 1895 there have been maintained in the city six pluviometer stations located in the central, south, west, northwest, north and northeast sections, each of which contains an automatic recording instrument. In preparing the curve, shown herewith, the records for a period of ten years, from 1905 to 1914 inclusive, were investigated. All storms showing a five-minute intensity equivalent to a rain-fall at the rate of one inch or more per hour were selected.

During this period, 138 storms furnished this minimum intensity and the actual intensities for 5, 10, 15, 20, 30, 45, 60, 90, 120, and 180 minutes were plotted and tabulated. The tabulated intensities were then examined for the highest value in each time interval, and this was listed as possible. Similarly, possible storms occurring 2, 3, etc., to 10 times in 10 years, were selected.

Giving due consideration to both safety and economy, it was decided to select, as a basis for sewage designing, the maximum storm performance that occurred ten times in ten years. The time-interval intensities of this tenth-rate storm were plotted, and a curve cutting 7 or 8 points approximated a parabola. A formula for the true parabola that would most nearly coincide with the plotted points was then worked out, the formula being $Y=18.5X^{-0.6}$. This curve is shown by the heavy line in the diagram.

WOOD BLOCK PAVEMENT ON WASHINGTON BOULEVARD

Swelling of Blocks and Bulging Therefrom After Several Years of Service—Author Believes Character of Oil Used Was Responsible.

By CHARLES C. BROWN.

The effect of the material used in treating the blocks for use in a wood block pavement upon the pavement during its life and upon the length of life is shown by the history of the pavement on Washington Boulevard, Indianapolis, Ind.



NEAR VIEW OF ONE OF THE BREAKS.

As may be seen from the accompanying photographs, the boulevard is a handsome driveway with wide pavement and lawns with a double row of trees on each side, through one of the newer and first-class residence districts of the city. It is used, when possible, by a large proportion of the pleasure drivers of the city and is one of the streets shown specially to visitors.

To make the pavement suit the surroundings and the traffic, wood block was selected as most satisfactory to the property owners and the city officials, but the history of the pavement has been unfortunate. The reasons for the defects have been studied and shown to be due to the material used in the treatment of the blocks.

The specifications for the street provided for injection into the blocks of 20 lbs. per cu. ft. of a mixture of creosote oil and coal tar. The experiments made under the U. S. Forestry Department and observation of blocks by experts have shown that, especially with so large a quantity of the injected fluid, a large proportion of the mixture remains very near the surfaces of the blocks at the ends of the fibers, which would be the top and bottom surfaces of the blocks as laid in the street. A certain amount of the mixture sticks to the surface and does not enter the blocks, but in the commercial treatment of the blocks is weighed in as a part of the material supposed to be injected into the blocks.



WASHINGTON BOULEVARD, SHOWING BULGING AND RUPTURING OF PAVEMENT.

The failure of the tar mixture to enter the blocks is attributed to various causes and seems to be due particularly to the fact that the tar cannot become fluid enough to enter the capillary voids in the fibers of the timber in the manner possible to creosote and other oils distilled from coal tar. The free carbon and more viscous constituents in the tar, left in the still when the oils proper for treating paving blocks are distilled off, cannot be forced into the minute voids of the wood. The penetrating oils may in part enter the fibers of the wood, but are in part prevented from entering by their mixture with the more viscous substances mentioned. The temperature of the treatment is limited by the ability of the wood to withstand high temperatures and limits the possibilities of producing greater fluidity by adding heat.

When blocks in this condition are laid in the street they are very likely to have a viscid film on the surface, and when the temperature increases under summer heat this film becomes sticky. At the same time the tarry mixture near the surface of the block expands under the heat and exudes upon the surface. This exudation is also sticky at the temperatures reached on the street surface, and soon the street shows the phenomenon called bleeding.

This description of what may be expected is exactly filled by the early history of the pavement on Washington Boulevard. During the hot weather of the first summers of its life, the residents at times could not bring their automobiles in over the street, and for pedestrians to cross the street it was necessary to lay planks to keep them out of the sea of tar.

This condition of affairs lasted for about three years. It is evident that the tar which exuded from the blocks could not get back into them, but was carried away in one way or another. It is also evident that when the expansion of the tar took place, the tar could not expand back into the block, both because the tar got as far into the block as it could when subjected to the comparatively high temperature and pressure during the treatment of the blocks and because the expansion of oil, air, or whatever was in the inner pores of the wood, acted to force the tar out rather than help it go farther in. Moreover, any drying out of possible moisture in the blocks would cause the cell walls of the wood fiber to contract and thus tend to force out any material which might have entered the cells. In the course of time, therefore, the successive expansions of the tar mixture would force out of the blocks most of the tar. In this case, as in many others, the bleeding stopped after about three years, or rather became very slight and unobjectionable.

The effects of the bleeding could be counteracted by proper treatment of the street by sanding, scraping when necessary, or other method suited to the special case, and this has been recommended and might serve as a palliative were there not an even more serious after effect.

For a number of years the pavement gave no particular trouble and remained in good condition with little cost for maintenance. The purpose of the 20-lb. treatment was apparently to make the blocks waterproof, and so long as the pores of the wood near the surface were filled with the tar mixture they were practically so, although the voids in the inner parts of the blocks were far from full of the injected material and far from being waterproofed. When the tar had left the blocks, through the successive expansions from year to year, the waterproofing was reduced in effectiveness, and after some years of the same action, less pronounced than during the first three years but still evident on close inspection at high summer temperatures, the wood fibers were left exposed to the action of water. When the waterproofing near

the surface was removed by the process described, the whole interior of the blocks, only slightly filled during the original treatment, was left open to the action of water, and it required only a special occasion, such as comes nearly every year and sometimes several times in a year, to subject the pavement to the maximum effect of expansion of the wood from the absorption of water. During the second week in February, 1918, a thaw and rain carried off considerable deposits of snow and a level street like that shown in the picture was very largely covered with standing and very slowly flowing water, so that the wooden blocks had full opportunity to drink their fill. The consequence is seen in the rows of blocks at intervals extending, some of them, entirely across the street, which have been thrown out upon the street surface by the bulging of the pavement, apparently from expansion lengthwise of the street.

The writer has for ten years asked for three qualities in the oil used for treating wood blocks, claiming that if the chemists will furnish such an oil the engineers can do the rest. These call for an oil that will

(1) Be heavy enough not to evaporate at the temperatures of the street,

(2) Be insoluble in water,

(3) Be liquid and penetrating enough to diffuse throughout the blocks at the temperatures usable in the processes of treatment.

The material with which the blocks used on Washington Boulevard were treated probably fails in part to meet the first condition, since the mixture probably included some very light oil, necessary to bring the specific gravity of the tar mixture within the specified specific gravity. This light oil doubtless penetrated the block much farther than the tar in the mixture, and it evaporated after the tar had bled away so as to leave the pores of the wood more open to the weather. It certainly failed to meet the third requirement, and it is probably impossible for a tar mixture to meet this requirement commercially.

A pure distillate oil of a specific gravity of 1.12 or more meets all these requirements. While it costs somewhat more than the tar mixture, the pavement really costs less because the expense of cleaning up the effects of the bleeding is practically cut off and the buckling is reduced to a minimum so that the expense of relaying broken areas is greatly decreased. These are accompanied by an increase in the life of the blocks, so that the pavement lasts longer. The slight increase in original cost, if there is any, is more than made up by either the reduction in cost of maintenance or the increase in life of the pavement.

EQUITABLE HIGHWAY CONTRACTS*

Would Benefit Both Parties Thereto—Overlooked Elements of Cost in Highway Contracting—Classification of Materials—Meeting War-Time Conditions.

The rapid growth of highway construction during the past few years has brought a large number of new contractors into the field, some of whom are not adequately prepared for handling the work. This not only has resulted in financial loss to the contractor, but also his sureties and bankers and the political subdivision for which the work is done and the general public has been compelled to share a part of such loss and also experienced inconvenience. The writer has had experience as both party of the first part and party of the second part to road contracts and can therefore appreciate both the

*Slightly abbreviated from a paper before the American Road Builders' Assn. by James C. Travilla, consulting engineer of the Dunn Wire-Cut-Lug Brick Co.

need of cooperation between commissions and contractors and the legal restrictions that prevent the former from using their judgment and so modifying relations between the contractors and themselves as to secure conditions more equitable to the former.

The specifications for highway construction have been very generally standardized. The conditions and stipulations entering into the contracts and specifications, together with their interpretation, have not. The estimates of cost of work frequently are based on incomplete or indefinite information regarding the cost of labor and material, average haul, approximate quantities, available water supply, suitable railroad facilities for receiving and unloading material, etc.

These uncertainties have resulted in introducing an element of risk to contractors bidding on highway work.

Highway commissions and contractors in estimating cost of work have not given sufficient attention to the fixed, overhead, incidental and plant expenses, labor and material market and cost data. The result has been low estimates and low bids, with unsatisfactory results to both parties, which have brought about a desire for a more equitable contract. The fixed, overhead, incidental and plant charges are very significant items in highway construction. Under this head may be properly classed the following:

Cost of bidding, contract bond, liability insurance, legal expenses, interest on deferred payments, discounting paper, traveling expenses, home and local office expenses, cost keeping, demurrage, miscellaneous freight and express charges, equipment charges, depreciation on equipment, moving equipment, tools lost, broken or stolen, loss due to weather conditions, damage to work by elements, payroll expenses during rainy and cold weather, watchmen, labor shortage, loss in damaged cement sacks, delays due to breakdowns and material shipments, cost of inspecting material, damage to private property, water charges, boarding and transporting men, entertainment, etc.

The commissions should provide proper engineering service and should not expect the contractors to furnish this or hold them responsible for mistakes due to faulty engineering. In France and England, from $3\frac{1}{2}$ per cent to 6 per cent of the estimated cost of the work is provided for engineering service, and this money probably is expended more advantageously than any other sum devoted to the highway construction. Specifications, design of pavement, supervision, inspection and final results of the work depend largely upon the ability of the engineer.

Modern highway construction presents to contractors as great a number of financial risks and uncertainties as will be experienced in any branch of public work. For example, the difficulty and expense of securing labor and holding the same on the job, due to the work frequently being in isolated places; the problem of material transportation by wagon, truck, tractors or light railways; inability to prepare definite figures as to the fixed expense for car demurrage; unforeseen weather conditions, and transportation difficulties and labor conditions having a direct bearing on this item; freight rates and their subjection to change—an important factor during the past year; assuring material supply by prompt unloading and storage piles; cement storage under cover and distribution of same; the expense and uncertainty of providing an adequate water supply; the difficulties and red tape in securing necessary railroad sidings and right of way for roads to the same; providing temporary roads and bridges during the period of construction; damage to work by automobile joy riders or from other vehicle

drivers who are selfish or ignorant of the damage it is possible to do to green construction by their unwillingness to be inconvenienced for a reasonable length of time (police powers of some kind should be granted to contractors to enforce observances of their road-closing signs and barricades); being responsible for damages to work by floods or other acts of God; specifying that contractors shall employ local labor and material; the loss of time by reason of delays in securing right of way, injunction proceedings, etc.; payment for work in warrants of questionable value. These possibilities in executing contracts help make the uncertainty and gamble to the contractors in preparing bids and in contracting for highway construction.

Highway commissioners have not always given sufficient attention to the proper classification of material and details of construction in preparing specifications. It is not unusual to provide for grading with no classification. This also applies to foundation excavation, where no distinction is made between "wet" and "dry" excavation. The equalization of cuts and fills and proper provisions for borrow pits, disposal of surplus material, and the determination of over-hauls are essential. Preparing the sub-grade and compensation for removal of soft or spongy material and its replacement with durable material are items of expense that should be provided for. The problem of drainage should be pre-determined and items should be provided in contracts for tiling and ditching. A reasonable unit price should be stipulated for rolling both the sub-grade and road materials.

Many contracts fail to allow monthly estimates for material delivered on the job, which is not equitable to the dealers in materials or to the contractor. Nor do contracts provide for acceptance and final payment for part of the completed roadway; where the work is of sufficient magnitude, requiring one or more years to complete the same, this provision does an injustice to the contractor. There should be a fixed unit of two to ten miles of a completed roadway accepted and final payment allowed. A reasonable retainer of the monthly estimates is desired. Ten per cent should be considered sufficient to properly protect the commission's interests. However, it is not unusual to find the retained percentage to be 15 or more per cent.

The economic value of inspecting materials at place of loading instead of the point of delivery would frequently result in saving time and money to both parties.

The question of maintenance of roads used for hauling road material from railroad sidings and gravel pits is sometimes raised and it is not unusual to place this burden upon the contractor.

These features of highway construction are cited to show the importance of equitable contracts between highway commissions and contractors. If the highway commissions are known to be fair and equitable in the adjustment of such difficulties as they arise, it is not unusual for contractors to submit lower bids on the work proposed. Where specifications and stipulations therein are rigidly adhered to without reasonable adjustment of differences according to the spirit and intent of the contract, the bids are usually higher.

In suggesting features coming directly under the direction of highway commissions in preparing specifications, contracts, and in the execution of work, there is also an obligation on the part of contractors and the material interests identified with them to be fair and reasonable in their dealings with the highway commissions. Contractors should take pride in their work, be financially responsible to carry it through, provide modern equipment and an organization of competent men and, further, have established a reputation for doing good

work. It should not be difficult to agree upon more equitable contracts when these features as set forth are fully appreciated by both parties.

At road lettings, it has been the general practice to call for unit bids based upon approximate quantities. Under normal conditions this method is more satisfactory in road work than to bid a lump sum for the completed improvement. The unfortunate feature of public lettings is the awarding of contracts to the lowest bidders regardless of their responsibility or experience. The highway commissions not infrequently figure it will be necessary to depend upon the sureties or "some angel" to complete the work.

This condition may be somewhat remedied by requiring certain qualifications of a bidder as to financial ability, experience, equipment, etc., before giving him a bidding blank. The size of job should be sufficient to attract responsible bidders and warrant the expenditure of proper sums for modern equipment and appliances.

The officials of railroad and electric railway companies, when about to build railroads, generally invite a limited number of responsible contractors to submit proposals for the work at cost plus a fixed sum or on a unit basis. Such contracts usually are executed without "grief" to either party.

Owing to legal restrictions placed upon highway commissions under our present form of government, this procedure does not seem possible, especially when we realize that politics have not been entirely eliminated from road construction, the limited tenure of office of public officials, and the general lack of confidence on the part of the public in its servants, regardless of their honesty, ability or unselfish efforts to faithfully carry out the trust imposed in them.

The precedent established by The American Institute of Architects in adopting standard documents, including contracts, specifications, etc., and by making the general conditions and stipulations more equitable to the contracting parties and by introducing the very important principle of arbitration, if followed by highway commissions would result in the creation of more equitable contracts between the contracting parties. The State Highway Engineers Association is working on the standardization of highway specifications and forms of contracts. The enactment of laws where necessary, authorizing arbitration of all questions in dispute between highway commissions and contractors, is considered an essential before standard and equitable relations can be established between the contracting parties.

WAR-TIME CONTRACTS.

The suggestions herein offered for more equitable contracts between contracting parties for highway construction are not all that are desired under the present abnormal conditions of the labor and material market which necessitate contractors assuming an unjustifiable amount of risk in signing contracts.

The recognized necessity of continuing to build selected highways that will best serve the country in time of war as well as peace, and to further provide for the employment of a class of labor not adapted for work in munition plants and other industries necessary to help win the war, make it of sufficient economic importance for the prosperity of all classes of labor to proceed with the improvement of selected highways in a manner equitable to both parties to the contract. Several methods of letting work to accomplish this end are suggested:

(1) The contractors to submit proposals on a form, provided by the highway commission, that sets forth the rates of labor, estimated cost of manufacturing materials and quotations on the materials required; the bids to be

tabulated, analyzed, and the award to be made on the best bid, considering all the items; the labor and material items to be not less than the prevailing rates and quotations recognized at the time of bidding. This information should be set forth in the instructions to bidders. The contractor shall at any future time, if required, be prepared to show by what procedure said prices were arrived at. Thereafter, the commissioners, on due proof of pay rolls, bills and receipts that the rates and quotations used in preparing the bid have been substantially increased, shall grant a hearing to the contractor and be authorized to allow such additions to the unit prices stated at time of letting as will insure the contractor against actual loss due to the changed rates and prices, but this shall in no case cover the losses due to inefficient handling of the work or from faulty estimating of said cost. It is preferable that at the time of change in the wage scale or advance in price of material, the contractor be requested to at once ask for a hearing before the commission to determine whether the request shall be allowed. If the commission decides that it is better to delay the work, it shall make an equitable adjustment with the contractor to cover the fixed charges such as plant rental, overhead and incidental expenses for the delay caused in completion of contract. It should be further provided that in the event of extraordinary conditions such as embargoes on cars or material beyond the control of the contractor which caused delay in the completion of the work, an allowance shall be made in the specified time limit for doing the work; and if a loss is incurred from such delay, he should be reimbursed for the expense of plant rental and necessary overhead and incidental charges.

(2) Another equitable method of constructing highways is to have the highway commission purchase and deliver road material F. O. B. nearest railroad siding, the contractor's proposal to provide for furnishing labor, equipment and appliances, the labor to be paid the prevailing rates and the equipment at a fixed rental per diem for the actual time used, all of which is to be definitely set forth on the bidding blank, including the percentage of the cost of labor to be allowed the contractor for his profit and overhead expense.

(3) A method sometimes adopted in awarding contracts is to allow the contractor the actual reasonable cost of labor and material entering permanently into the work, as determined by the highway commission, plus a fixed per cent of such work. In figuring the labor cost of highway construction, the following items shall be included:

- (1) Actual pay roll expenditures for labor.
- (2) Foremen and time keeping on the work.
- (3) Liability insurance paid on same.

The cost of materials entering into the work will be determined by the material, freight and hauling bills for the same. The fixed per cent allowed to cover the profit, overhead, equipment and incidental expense.

In conclusion, it may be stated the personnel of the commission and the laws on the statute books are important factors in arriving at equitable contracts between the contracting parties. Given commissioners who have had liberal business or technical training, working under reasonable legal restrictions and dealing with contractors of the same type, both parties appreciating the financial risk and uncertainty in entering into contracts under the present abnormal conditions, the contingent expenses heretofore referred to, and the suggested methods of eliminating such risks, then both parties should be in a position to cooperate in drafting an equitable contract between highway commissions and contractors.

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THE 1918 ROAD PROGRAM.

How much road work will actually be done during the present year it would be impossible for anyone to forecast, since so many conditions may arise to affect it, these involving the raising of the funds, securing of materials and transportation of same, and obtaining the necessary labor. So far as intentions are concerned, however, the road construction program as outlined for the year exceeds in money value that of any previous year and is nearly double that spent in 1917. This statement is based upon information compiled by a large and reputable manufacturing concern, which states that the figures were obtained from the highway officials of the various states. These sums include, we understand, the amounts to be spent by state authorities, together with those to be contributed from the federal aid fund, and also the amounts to be spent by counties. The sums attributed to the individual states vary from \$560,000 in the case of Nevada to \$25,000,000 for the state of Texas. The total for all the states is more than \$263,000,000.

In no case, we believe, has any state a desire to interfere with the use of money, materials, or labor that are essential to the war; and we presume that in the majority of cases a very important consideration in the formulating of the road program was the necessity of supplying highways for the transportation of food and war materials or for relieving railway transportation by motor truck traffic. In the case of Texas, for instance, whose ambitious program exceeds by 50 per cent that of its closest competitor, it has been widely advertised that the aim of the state highway department is to provide "military roads," furnishing connected routes both east and west and north and south across the enormous expanse of that state.

Probably the first obstacle that may present itself in the forwarding of this program will be the financial one. It remains to be seen what will be the attitude of the federal administration toward the issuing of bonds for this large amount, and whether a market can be found for them at a reasonable rate of interest. The effect which such bonds would have upon the floating of the government Liberty Bonds is, of course, an important point. Large as the sum is, however, it is to be borne in mind that it is to be raised and spent over the entire area of the United States, and the total amount involved does not exceed probably 5 per cent of the amount of Liberty Bonds that will be issued this year.

In the matter of obtaining material, much can be done by the states themselves towards solving or anticipating any difficulties along this line. If every effort is made to locate and utilize local materials or those within truck-hauling distance, this difficulty can be largely avoided in most cases. In some states and for some highways, the complete attainment of this will perhaps be impracticable. For instance, a considerable amount of bituminous binder will perhaps be considered essential on a large percentage of the roads, and this material is "local" over only a limited section of the country. If either brick or concrete wearing-surface is substituted for a bituminous one, here again we find only a limited percentage of the entire country which can obtain these materials within truck-hauling distance. In spite of this, however, much can be done in every state to reduce to a minimum the amount of hauling required by its road program, both in choosing materials and in seeking local supplies of them.

In the matter of labor, we have already suggested that a much more extensive use could be made of those who are maintained in idleness at the expense of the state, these being to a large extent the prisoners in jails and reformatories with possibly some use of those on poor farms and in other institutions. An additional source of labor is suggested by a law that is just being put into force in the state of New Jersey, requiring every male whose age and physical condition does not debar him from labor to engage in some useful employment, and if he does not find such employment himself, the state will itself put him to work, as a free man if he will, but if not as a prisoner. If this law should be adopted generally throughout the country, we believe that any state could round up, in its large cities, enough idlers to go a long way toward carrying out its road construction program.

ENGINEERS WITH DITCHING AND DRAINING EXPERIENCE WANTED.

The U. S. Public Health Service is in pressing and immediate need of engineers who have had experience in ditching and draining operations, to assist it in taking measures for the prevention of malaria in districts adjacent to southern cantonments. This offers an opportunity to a number of engineers to aid materially in winning the war, especially to those who may have been refused military service because of slight physical defects.

The adequate control of malaria is essential to the maintenance of the health of troops in the south as well as those residing in districts adjacent to military cantonments. Helping to control the malaria situation is therefore an important piece of war work, and it is hoped that all engineers who have had any experience which would assist them in performing such service will communicate at once with the "Surgeon-General of the U. S. Public Health Service, Washington, D. C."

The WEEK'S NEWS

Improvements on Lincoln Highway—Repaving New York's Streets—Work of Oklahoma's State Health Board—Disease Among U. S. Military Forces—Philadelphia Suburbs Win Lower Water Rates—New Jersey Gas and Electric Utilities Get Emergency Rate Increase—National Daylight Saving to Be Inaugurated—Fire Equipment Standardization in Connecticut—Commission Form Elections in Three Towns—San Francisco Research Bureau Wins Right to Examine City Records—Portland, Ore., to Fight Six-Cent Fare.

ROADS AND PAVEMENTS

Type of Pavement on Lincoln Highway.

Detroit Mich.—According to the Lincoln Highway Association, work done upon the Lincoln Highway from coast to coast includes the following types and the mileage of each:

	Miles.
Concrete	227
Brick	104
Bituminous macadam, resurfaced.....	395
Macadam, new construction.....	37
Macadam, resurfaced	275
Gravel	415
Natural dirt road graded.....	750
Total	2,250

The remaining one thousand miles of Lincoln Highway is, of course, not entirely unimproved. Much of the road was in an improved condition before it was designated as a part of the Lincoln Highway and remains so today. An important feature connected with the improvement is the reduction in mileage being made upon the road between the two terminal points at New York and San Francisco. As originally outlined, it was the purpose of the Lincoln Highway Association to establish the route from coast to coast in the most practical and efficient manner and as near in a direct line as was consistent with the topography of the country. As originally laid out the Lincoln Highway was 3,389 miles in length. According to the figures just compiled by H. C. Ostermann, field secretary of the association, this mileage has now been reduced to 3,325 miles, the decrease being accounted for by the elimination of sharp turns and the building of many new bridges, permitting a marked straightening of the road. The high efficiency of the Lincoln Highway as through, connected route of travel from the Atlantic to the Pacific is indicated by a comparison with other existing mileages. The air line between New York and San Francisco is 2,700 miles. The best railroad connection is 3,181 miles, and 3,370 miles of telephone wire are needed to connect the two points.

Court Says Pavement on Old Base Is Repavement.

Newark, N. J.—Street repaving is none the less repaving, even though a pre-existing concrete base is utilized. This is the basis of a decision by Judge Adams in the Circuit Court, confirming assessments which were objected to by Roseville avenue property owners. The point at issue was the protestors' contention that the pavement constituted merely repairs, and that the cost should be levied on the city at large. The city's claim was that the work was repavement and justified assessment on the property owners. "If the concrete base had been torn up and another base substituted for it," runs the decision, "so all the material would have been new, that would have been repaving, but repaving of an extravagant kind, and the arm of the law might have been extended to arrest such a waste of money." Rosedale avenue was bricked in 1896. The brick was set in sand on a concrete base. Repairs made from 1905 to 1915 cost the city \$2,072.12. A change was needed, but property owners were divided, some favoring a sheet of asphalt on the brick and others a substitution of asphalt block or wood block. It was recommended that the concrete foundation and the curbstone be retained

so far as available, and that additional catch basins be put in. The board of works heard representatives of the land owners and finally adopted the plan of laying wood blocks. Of the cost, totaling \$44,886.20, about thirty-one per cent, or \$13,336.60, was apportioned to the city, and \$31,549.60 to the land owners. Judge Adams, in his decision, said the court has nothing to do with the comparative merits of the different plans of improving the street. He pointed out that the choice rested in the official judgment of the board of works, and called attention to the fact that the ordinance treated it as a repaving. Answering his own question of "Was it repaving?" Judge Adams continued: "It substituted another pavement for brick for the entire width of the street. It was a plain dictate of economy that the pre-existing concrete base should be used as far as possible, and this was done. About six and one-half per cent of new curb was put in. All the rest of the old curb was either reset in concrete or dressed as it was in place. About three-fourths of the concrete base was intact and was used."

New York's Repaving Program.

New York, N. Y.—The board of estimate has made appropriations aggregating \$3,500,000 for the repaving of streets in the various boroughs in the current year. Of the total amount \$2,000,000 was allotted to Manhattan, \$600,000 to Brooklyn, \$400,000 to the Bronx, \$300,000 to Queens, and \$200,000 to Richmond. Manhattan's appropriation for repaving work, which is much larger than it has been in recent years, was urged by borough president Frank Dowling because of the condition of the pavements throughout the borough. With the money appropriated president Dowling said that portions of seventy-five of the principal thoroughfares of the borough would be repaved. Twenty-seven of the streets and avenues leading to ferries and steamship piers will be repaved with granite blocks of the most modern type and forty-eight will be restored with sheet asphalt. In nearly every case the pavement will be laid on concrete foundation. It is stated that no wood block or asphalt block will be used in the work to be undertaken this year. Seven of the thoroughfares under which new subway tunnels have been constructed are included in president Dowling's repaving program. It is expected that most of the work will be under way before May 1.

SEWERAGE AND SANITATION

Ask Coal Supply for Passaic Sewer Work.

Newark, N. J.—Pleading the need from a sanitary viewpoint of the expeditious completion of the Passaic Valley sewerage system, a letter asking assistance in procuring a regular supply of coal for the construction contractors has been sent to Fuel Administrator Garfield by the Passaic Valley sewerage commissioners. The communication asserts the system will relieve the pollution of the Passaic River. After expressing appreciation of the assistance given on previous occasions when lack of coal indicated the task would have to be suspended temporarily, the letter says:

"The Passaic Valley sewerage project, which the commissioners are constructing under appointment by the Governor of New Jersey, consists of extensive metropolitan sewerage works designed to intercept from twenty municipalities the sewage flow which is now being discharged into the Passaic River and Newark Bay.

"These twenty municipalities have a present population of

about one million and the total sewage discharged by them into the Passaic River approximates 120,000,000 gallons daily. As a consequence of this discharge of sewage, the Passaic River is highly polluted, in fact, it is one of the foulest streams in the United States. The waters of the river are heavy and black, are devoid of oxygen and without fish or animal life.

"The odor under summer heat is almost unbearable. It is needless to point out the insanitary and depressing effect of such a tidal stream, the waters of which flow back and forth twice each day. The communities affected, as well as the state of New Jersey, are keenly anxious to be rid of this menace to health and to free themselves from the train of insanitary conditions which emanate from the polluted waters.

"Upon the completion of sewerage works, the sewage and trade wastes will be diverted from the river to treatment works. After clarification the sewage effluent will be discharged through deep sea outlets and disposed of in a modern and sanitary manner. Construction work was begun on the project in 1912. Since that date the work completed, or under contract and approaching completion, totals \$12,500,000.

"The estimated cost for completion is \$3,000,000, and the time required is about eighteen months. None of the work which has been done can be used and no advantage of the large sum of money already spent can be had until the completion of the remaining portions of the outfall works.

"The abatement of the nuisance set up by the Passaic River and marked improvement of the sanitary conditions of this populous district will be an item of no small importance to many large industrial plants which are actively employed on war work, to the shipping on the river, to the extensive quartermaster's stores which are being built adjacent to the polluted shores, and to the immense ship yards which are in operation for the Shipping Board.

"With these facts before you, the importance of the early completion of the Passaic Valley sewerage works to the metropolitan district of New Jersey becomes clear from the medical and sanitary and industrial points of view. Unless coal can be regularly obtained, the progress upon the works cannot be maintained.

"The commissioners are appreciative of the assistance which the fuel administration has rendered and they request that future consideration be given as to future coal supply needed."

Book Explains Work of Health Board.

Oklahoma City, Okla.—A very thorough and practical health book has been prepared by the state board of health and is now being distributed. The book contains not only the rules and regulations of the state board, but much other practical matter relating to the conservation of public health. It is the work of Dr. John W. Duke, state health commissioner, and Dr. Herbert V. L. Sapper, assistant commissioner. It is intended for distribution to all public health officers in the state, to physicians, to other officials who may desire it, to school principals, heads of women's clubs and other similar organizations, and in general to all to whom it may be of service in bettering public health conditions. This book consists of about 250 pages and is in a form convenient for distribution and reference. The scope and powers of the state health board are fully explained. The book is divided into nine parts and an index as follows: Fundamental laws governing the state health board; sanitation and quarantine code; protection of water supplies and sewage disposal; public nuisances and health regulations; food and drug standards; rules governing food making establishments and rules and regulations covering sanitary conditions in hotels and rooming houses; rules for the disposal of bodies; vital statistics regulations; miscellaneous sanitary regulations, especially those aiming at co-operation with Federal health authorities; rules regulating state laboratories and distribution of antitoxin; general index. The book is provided with convenient cross references.

Rigid Inspection and Scoring of Drug Stores.

Cleveland, O.—A "score card" system has been inaugurated by the city chemist, Wilbur White, to check unsanitary conditions in Cleveland drug stores. Cleveland, according to Mr. White, will be the first city in the country in which this plan will be adopted in connection with pharmacies. A city wide sanitary inspection of drug stores has been begun by officials attached to the chemist's office. On the basis of the conditions found in each, cards will be issued by which the public may know whether the drug store in which they are dealing is clean or otherwise. "Most of the drug stores in Cleveland are in very good shape," the city chemist stated, "but there are some in which conditions are far from desirable. Our investigation is intended to make an end of such things as dirty prescription cases, balances or other utensils. When it is completed, the score cards will be issued and the results published. A white card will be given to drug stores which score 90 or over, which stands for the highest standard.

Blue cards will score between 80 and 90, representing fair conditions of the store, and red cards will designate scores below 80, which will be considered unsatisfactory." Mr. White stated a similar scoring system has been in effect two years with reference to groceries and dairies. The investigation, the official indicated, would also be directed at druggists who are handling "fake drugs," of which he declared about 400 packages had been seized recently. He said all pharmacists had been warned against these goods and that in case any more are discovered there are to be prosecutions. Practically all substances put under ban by city chemist White, he explained, are imitations of Gorman, Swiss and American drugs, the cost of which, if genuine, would be as high as \$60 a pound.

Disease Rates in Army.

Washington, D. C.—This table, from reports to the Surgeon General of the Army for the week ending March 1, gives the annual rate per 1,000 for special diseases among the troops in this country and the Expeditionary Forces:

	All troops in United States.	Regulars in United States.	National Guard, all camps.	National Army, all camps.	Expeditionary Forces (week ending Feb. 21, 1918).
Pneumonia	19.7	22	20.6	16.8	21.3
Dysentery	0.2	0.2	0.1	0.3	0.4
Malaria	0.5	0.8	1.3	0.0	0.4
Venereal	97.1	121.5	53.4	100.6	55.3
Paratyphoid	0.0	0.0	0.0	0.0	0.0
Typhoid	0.2	0.6	0.0	0.1	0.0
Measles	34.7	54.7	10.2	31.1	26.9
Meningitis	1.5	1.7	1.9	1.3	6
Scarlet fever	12	14.6	2.9	14.5	10.5

WATER SUPPLY

Lower Rates for Philadelphia Suburbs.

Philadelphia, Pa.—Residents of the suburbs of Philadelphia scored a victory against the Springfield Consolidated Water Company, when the public service commission issued an order at Harrisburg directing the company to establish a new schedule of rates, effective April 1. As a result of this decision at least a third of the customers of the water company will enjoy a reduction of about one-third in their water rate annually. The announcement was heralded as a victory by the suburbanites, who have been fighting the rates of the company since 1910. The commission has fixed \$6,953,320 as a fair value of the company. According to the order, the concern, which supplies water to scores of suburban towns, is allowed a return of 7 per cent upon that valuation. The commission's order disposes finally of the complaints of the residents of Conshohocken and the boroughs of Clifton Heights, Tinicum, Darby, Glenolden and Eddystone. The commission for several years has been investigating the complaints and making an inventory of the company's assets and a survey of the watersheds from which the supply comes. The case was the most important involving a water company that has come before the commission. The testimony was closed in October, 1917. The report prepared by the accountants and engineers for the state filled forty volumes. It is said that the state expended a sum in excess of \$20,000 in the preparation of the case.

The order fixes uniform rates for the entire district, which is one of the largest supplied by a private water company in the state. The new schedule of rates fixed by the commission provides for a minimum payment dependent upon the size of the meter to each consumer. This minimum for a five-eighths-inch meter is \$12 per annum and increases gradually to \$300 for four-inch meter. In every case the minimum payment covers the furnishing of 30,000 gallons of water a year. At present the rate for the five-eighths-inch meter is \$18 a year and provides for 45,000 gallons yearly. It is estimated by W. H. Roth, secretary of the company, that at least 33 per cent of its customers do not use in excess of 30,000 gallons of water a year. But despite the fact that they did not utilize their quota of water, they had to pay the full rate. Under the new rate this particular class of customers will enjoy a reduc-

tion in rate of 331-3 per cent. Of the 1,200 service customers in Conshohocken more than 900 use the five-eighths-inch meter and will have their rate reduced \$6 a year. The commission decided that extensive improvements and enlargements of the system are required and the construction of this work must start at once, the work being divided into yearly programs covering a period of three years. The estimated cost of improvements to be installed this year is \$1,048,100. This sum was added to the fair value to obtain the amount upon which the return to the company should be figured. The company is therefore allowed a net return of \$560,099. The commission estimated the annual operating expenses should be \$262,500, with an allowance for depreciation of \$59,633, making a gross annual revenue of \$882,232. The company is directed to make all street extensions which are reasonably required, thus removing one of the greatest sources of complaint. Prior to this time consumers have been required to pay for street extensions, involving over fifty feet of 6-inch pipe. Rates are fixed for fire service dependent upon the number of miles of pipe over four inches in diameter in each municipality, and it is calculated that the charges for fire service will return a revenue of \$180,130, while those for domestic service will bring in \$702,102. The fight against the water company was waged in the Common Pleas Court of Montgomery County in 1910. At the end of two years the court ruled that the burden of proof rested on the complainants. The case was subsequently brought before the public service commission, shortly after that body was appointed. The commission reversed the finding of the Montgomery County court and placed the burden of proof on the water company. The new rates are:

A. MINIMUM CHARGE SCHEDULE.

All services except public and private fire services shall be subject to a minimum charge, which shall include the furnishing of 30,000 gallons of water annually. This minimum charge shall be based upon the size of meter and shall be as follows, payable quarterly:

	Per Annum
For a meter $\frac{1}{2}$ inch or less.....	\$12
For a meter $\frac{3}{4}$ inch or less.....	16
For a meter 1 inch or less.....	25
For a meter $1\frac{1}{2}$ inch or less.....	50
For a meter $1\frac{3}{4}$ inch or less.....	65
For a meter 2 inch or less.....	85
For a meter $2\frac{1}{2}$ inch or less.....	125
For a meter 3 inch or less.....	175
For a meter 4 inch or less.....	300

B. METER SCHEDULE.

All output services of whatever kind rendered by the respondent to its patrons shall be on the meter basis, as follows:
In excess of 30,000 gallons and up to 500,000 gallons, twenty-one cents per 1000 gallons.

In excess of 500,000 gallons and up to 2,000,000 gallons, eighteen cents per 1000 gallons.

In excess of 2,000,000 gallons, twelve and one-half cents per 1000 gallons.

C. PUBLIC FIRE PROTECTION SCHEDULE.

For all public fire services the following yearly charges will be made:

For each public fire hydrant in each political subdivision, \$7 per annum.

For each mile of pipe four inches or greater in diameter in each political subdivision where such pipe furnishes actual or potential public fire service, \$355 per annum.

D. PRIVATE FIRE PROTECTION SCHEDULE.

For all private fire protection services the following yearly charge will be made:

Where hydrants are owned by the water company, \$15 per annum.

E. Where service is now being rendered at a flat rate meters shall be installed by the company at its expense as rapidly as possible and the installations completed prior to January 1, 1919; in the meantime such service to be charged for at a flat rate to be fixed by the company with the approval of the commission, such rate to be computed so as to result in reductions comparable to those provided for in the meter rate schedule. These services are to be paid for in advance quarterly.

Angry Consumers Destroy Meters.

Upland, Cal.—Because residents of the Cucamonga district had received water for domestic use for ten years or more at a flat monthly rate, they took violent exception to the installation by the California Vineyards Improvement company of water meters. By way of showing their displeasure, a score or more attacked the measuring devices with sledge hammers, chisels and other instruments, in many cases tearing the meters out bodily. The company, under contract to supply domestic water, threatened to cut off the supply entirely. The consumers have decided to take the matter before the state railway commission. At a hearing before examiner Westover a number of con-

sumers sought to force the Vineyards company to supply an adequate amount of water to all consumers the year around, claiming that those at the upper end of the system are frequently without it. The company in turn asked the commission to fix a rate sufficiently high to prevent consumers on the lower end of the lines from using as much as 50,000 gallons for irrigation instead of their allotted 4,000 gallons, thus draining the system. The Vineyards company contends that it has only a limited supply of water and that unless action is taken to prevent its promiscuous use by part of the consumers, others will suffer.

Water Superintendent Reinstated.

Youngstown, O.—John S. Lewis, deposed superintendent of city water works, has been reinstated in his position by the court of appeals, which ordered a writ of mandamus issued against mayor A. W. Craver and service director William L. Sause. Proceedings in the civil service commission to which had been appealed the removal order against Sause, were reviewed and the contentions of Lewis that charges of inefficiency and incompetency were not sufficiently explanatory for him to answer them were upheld.

STREET LIGHTING AND POWER

Extensions by Ontario Power Commission.

Toronto, Ont.—The provincial government has appropriated \$9,054,951 for expenditure on capital account by the Ontario Hydro-Electric Power Commission. The main extensions and improvements are as follows: Chippawa Creek development, \$4,175,000; Niagara system extensions, \$2,865,000; Central Ontario system extensions, \$528,000; Severn system, \$405,000; Eugenia Falls system, \$233,000; Port Arthur system, \$150,000; St. Lawrence system, \$251,000; Rideau system, \$117,000; Nipissing system, \$60,000.

Big War-Time Rate Increase for Jersey Utilities.

Trenton, N. J.—Declaring that it is of prime importance that the property of public utilities be maintained in condition to render effective service, the public utility commission recently handed down two decisions under which the Public Service Gas and Public Service Electric companies will be permitted to increase their rates so as to yield a revenue of approximately \$1,000,000 a year to each company more than would be received under existing rates. The board emphasizes the fact that the increases are approved solely as war-emergency measures and do not affect the reasonableness of the proposed rates in normal times. The board also reserved the right to abrogate or modify the new rates should conditions indicated by operating results warrant such action. The increased rates, which were made applicable in February, are not in accordance with the original suggestions of the gas and electric companies, but are based upon the board's findings as to the equitable method of providing additional revenue. In the case of the Public Service Electric company, instead of permitting the horizontal rise of about 35 per cent on current furnished for power purposes the board decided that the company may add to each bill of power customers a war addition of 25 per cent. In addition it allowed a surcharge for coal, though on a different basis from that now in force. To provide additional revenues for the Public Service Gas company the board authorized a war surcharge of seven cents per 1000 cubic feet of gas consumed to be added to all bills. It required the company to withdraw all rates under the present schedule which are less than sixty-five cents per 1000 cubic feet. This provision affects only the large consumers. The estimate of the company for operation in 1918, after paying rentals, 8 per cent on outstanding capital stock and \$1,500,000 to be used for construction and working capital and providing general amortization, showed a prospective deficit of \$1,338,000. The board pointed out that in this estimate the appropriation for general amortization was a little more than double the amount it would be under the rule applied by the company in the four years prior to 1917, while the appropriation for 1917 amounted to only

a quarter of such appropriation. In disposing of the request of the Public Service Electric company for an increase of revenues approximately \$1,800,000 a year the board said it was evident it should not approve an increase of more than \$1,400,000 over what would be obtained from the present rate. Considering all factors, the board expressed the opinion that an increase of \$1,000,000 would enable the company in 1918 to pay its rentals, to pay dividends of 8 per cent on its capital stock and to appropriate to general amortization a sufficient sum under present conditions, even should these continue throughout the year to be as unfavorable as the estimates of the company indicate. "The board does this entirely as a war emergency measure," says the decision with regard to the gas surcharge, "and does not at this time pass upon the reasonableness of the rentals and dividends paid by the company; nor upon the reasonableness of the company's appropriations for general amortization. Such and like matters must be left for consideration under normal conditions."

Right to Refuse Electric Service.

New York, N. Y.—In a decision on the question of discontinuing of electric service in a complaint against Richmond Light & Railroad company, the public service commission of the first district holds that refusal of service by an electrical corporation except upon payment of a penalty because the service connection has been tampered with is unauthorized under the law. Because, however, complainant may obtain redress by the penalty action under the transportation corporations law and because of the uncertainty as to the commission's power herein, no order was adopted. It was recommended that upon payment by the complainant of \$1.80 for each of the three months during which the meter failed to register service be renewed by the electric company.

Daylight Saving Bill a Law.

Washington, D. C.—The daylight saving bill has been signed by President Wilson. It puts all clocks forward an hour on the last Sunday in March and turns them back again the last Sunday in October. The daylight saving plan will be in effect during that period and be observed without the slightest disorganization or impairment of existing conditions. Trains will run as usual, and every feature of daily life into which the element of time enters will remain unchanged. The plan's practicability and efficiency have been demonstrated in twelve European countries. Advocates of the plan in presenting their case to Congress explained that the following beneficial results would be achieved by the system: A great saving of illuminants, such as oil, gas, and electric power. Marked conservation of coal. Increased manufacturing production as the result of improvement in working conditions. General benefits to the national health because of an additional hour of daylight, which may be devoted to recreation. Reduction in the cost of living to some who can raise garden truck for domestic consumption.

Fifty-two reasons for passing the bill were given to Congress by the committee on daylight saving of the United States chamber of commerce. The savings would occur in both direct and indirect ways, says the report. The amount of coal that will be saved if the clock is moved ahead one hour would differ with the method in which daylight saving is used. Calculations computed for different periods, based upon the actual British experience in the summer of 1916, and modified by allowances for differences in latitude, give the following savings in coal for the United States:

1. With saving of 150 hours (by daylight saving between second Sunday in April and last Sunday in September): Amount of coal used for lighting through gas and electricity, approximately 15,750,000 tons; amount saved, 804,000 tons; percentage saved, 5 per cent.
2. With saving 190 hours (with clocks moved ahead one hour between April 1 and November 30): Amount of coal used for lighting through gas and electricity, approximately 15,750,000 tons; amount saved, 1,019,000 tons; percentage saved, 6.5 per cent.
3. With saving of 198 hours (with clocks advanced one hour throughout the year): Amount of coal used for lighting through gas and electricity, approximately 15,750,000 tons; amount saved, 1,061,000 tons; percentage saved, 6.6 per cent.

"These figures do not include the saving which would

be obtained at isolated plants and at electric power plants which sell power for lighting. To be borne in mind, too," says the report, "is the fact that the estimate has been made on a basis which assumes the use of electric energy and gas for lighting is spread evenly over the country, whereas, as a matter of fact, 57,000,000 electric lights out of a total of 76,000,000 in the country are in New England, Middle Atlantic and North Central states where the advantages of daylight saving will be most striking. For example, take the Commonwealth Edison Co. of Chicago, whose peak load is needed for no more than one and one-half hours a day."

Increased Efficiency of English Plant.

Bristol, England.—The municipal authorities of this city have decided to extend the electrical plant by providing a 6,000-kilowatt turbo-alternator, four water-tube boilers, and a switch gear. These extensions are necessary on account of the increased demand for electricity. In regard to the scarcity of coal, it has been pointed out that, while 18.75 pounds of coal were consumed in 1895 to produce a unit of electricity, in 1917 the quantity to produce a unit was reduced to 4.938 pounds. The coal consumption per unit has been cut to approximately a quarter what it was 20 years ago. While in 1917 only 56,000 tons of coal were consumed, at the former rate of consumption 200,000 tons would have been used.

FIRE AND POLICE

Urge Standardization of Fire Equipment.

Hartford, Conn.—Towns and cities in Connecticut which have fire departments are to be called upon by the Connecticut state council of defense to put into effect throughout the entire state a plan for the interchange of fire apparatus in emergencies. The matter has been investigated by the council's committee on industrial survey, which has reported that, due to the efforts in the past few years of the Fire Chiefs' association, there is mutual aid co-operation to a very considerable extent among the various towns and cities. The committee recognized the desirability of a standard thread on hose and hydrant couplings throughout the state, but did not recommend at this time any effort to change the various threads now used. Instead, it recommended most strongly that every fire department in the state be equipped with a sufficient number of standard adapter couplings to permit of ready mutual aid. The adapter coupling proposed has been designed under the direction of John C. Moran, chief of the Hartford fire department, who was named by the Fire Chiefs' association a committee of one to assist the council's committee in this matter. The committee also has had the benefit of the advice of Horace B. Clark, chairman of the board of fire commissioners of Hartford. The state council of defense has arranged to secure these couplings at \$5.75 each on orders in excess of 350 pieces, and towns are to be given an opportunity to buy them from the council at this rate. The committee makes the following recommendations: "That it be authorized in the name of the council to instruct the various local agencies of the council as follows: (1) In cases where authority is not at present vested in the chief or acting chief to ask or render assistance in emergency, to obtain for him such authority. (2) To arrange with the local departments in their districts, to place orders directly on the state council of defense for a suitable number of hydrant and hose couplings."

Big Courthouse Destroyed.

Springfield, O.—Clark county's fine courthouse, which it is believed will cost \$500,000 to replace, is in ruins as a result of an early morning fire which gutted the building. A high wind was raging at the time, sweeping the flames in all directions and the entire department was summoned to combat it. The fire continued to rage despite the efforts of the department and the fact that ten lines of hose were playing on it for three hours. Aided by the strong gale, the flames spread rapidly at first, sweeping from one

end of the attic to the other and then down to the second floor. The clock in the tower was completely destroyed and tumbled over. The flames did not reach the records which were kept in the clerk's office on the lower floor. Most of them were stored in the vault and were not damaged. The sheriff's office on the lower floor was not damaged. The law library was also badly damaged. Prisoners in the county jail adjoining the court house became excited, and were removed to the city jail.

GOVERNMENT AND FINANCE

City Votes to Retain Commission.

Sioux City, Ia.—Sentiment of Sioux City voters at the special election was overwhelmingly expressed in favor of retaining the commission plan of government instead of returning to the aldermanic form. Exceeding even the predictions of the leaders among the defenders of the commission plan, the proposition to return to the aldermanic form was defeated by 1,780 majority. Out of the 5,710 votes cast the proposition to change the form of government received only 1,965, while the ballots against it totaled 3,745. A single precinct out of the fifteen in the city gave the aldermanic system a majority of 83 votes.

City Manager Plan Adopted.

Sioux Falls, S. D.—Sioux Falls adopted the city manager plan of municipal government, to supersede the present commission system, at a special election. The majority for the city manager advocates exceeded 700. A light vote was polled.

A motion was filed in the circuit court for an injunction to restrain the mayor and city from calling an election to choose nine new commissioners, as required under the city manager plan, on the grounds that the South Dakota statute, enacted by the 1917 legislature, granting authority to cities to adopt the manager plan is unconstitutional.

Illegal to Pay Salaries of Employees in Army.

Niles, O.—The state bureau of public accounting has decided that it is unlawful for municipalities to pay salaries of employees in military service. The finding was in a case where the council of Niles paid to Bert Halloway, superintendent of the light and power plant, half of his salary after he had enlisted in the army. This action of the council, the bureau held, is commendable but illegal.

Research Bureau Wins Right to See City Records.

San Francisco, Cal.—According to a decision by Superior Judge George E. Crothers, city officials must show records of the Hetch-Hetchy project to representatives of the Bureau of Governmental Research. The city engineer had refused to give the bureau, organized by taxpayers, access to public documents and records concerning the Hetch-Hetchy. Colbert Coldwell, representing the bureau, had brought suit against the city engineer and the board of works, for this refusal, and the city attorney in his answer had sought to evade the issue. When the plaintiff demurred to the answer, the issue came before Judge Crothers for action. Assistant city attorney Robert M. Searls said he would take an appeal direct to the supreme court. Otherwise the result of Judge Crothers' decision would be to bring the case to trial before him. In the answer, which is now thrown out of court, the city engineer had attempted to contend that papers in his office did not become public documents until the board of works has taken some action in a public meeting based upon them. Judge Crothers sweeps this pretense by quoting the Political Code, which expressly states: "The public records and all other matters in the office of any officer are at all times during office hours open to the inspection of any citizen of the state." Judge Crothers also calls attention to the Code of Civil Procedure, which provides that: "Every citizen has a right to inspect and take a copy of any public writing in this state, except as otherwise expressly provided by statute." It is not contended, says Judge Crothers, that the records in question, if held to be public records, come within the statutory exception. In regard to the public officer having records in his charge being allowed to use

his discretion as to whether the public may have access to them, he holds with the Appellate Court, which recently decided an almost identical question (*Musket vs. the Public Service of the City of Los Angeles*), that a county may be said to be an involuntary public corporation and the public residing therein virtually the corporators, and that the public records are the property of the county and not the property of the officer in whose custody they have been placed. It was held in that case that the officer is the mere custodian of the records, and his duty is to keep them safe for the use and benefit of the officers and public to whom they belong, and that under the common law and aside from any express statute, all such records are open to the inspection of any citizen.

But in the suit of the bureau against the board and the engineer, the judge calls attention to the fact that the charter of San Francisco expressly provides just what papers and records must be kept officially and what are open to public inspection, and leaves nothing to the discretion of any official, except as to police records. The charter provides that: "The board shall keep and preserve a record of all its proceedings, and copies of all plans, specifications, etc., and all papers pertaining to the transactions of the board," and also that "all books and records of every office and department shall be open to the inspection of any citizen at any time during business hours." According to a statement by Bruce Cornwall, chairman of the board of trustees of the research bureau, "the San Francisco Bureau of Governmental Research has maintained that records in public offices belong to the public, and that citizens are entitled to know the full facts at all times in regard to what is being done on any public project. The bureau, as an organization whose only weapon is facts, has always maintained that the questions involved in this case were bigger than Hetch-Hetchy—bigger than any current fact, project or person. It has always been our contention that fundamentally this was a question of mutual trust by citizens and officials. It is conceivable that the attitude of the city officials emanated from a misconception of the motives and purposes of this organization. Now that our position and motives have received recognition in Judge Crothers' decision, it is our hope that the authorities will recognize the place of the bureau as a citizens' agency whose sole actuating purpose is to serve the public as a whole and act as a staff organization in co-operation with officials of the city. Our only desire is to learn the truth in regard to Hetch-Hetchy, and our desire is now and always has been to give to the Hetch-Hetchy project a clean bill of health if the facts warrant it. We sincerely trust that an examination of the records will make this possible. The only purpose of the bureau in making such an examination is to assure the city against waste from error and we trust that the city officials will now see the wisdom of accepting the disinterested co-operation of the bureau to that end."

Commission Government Adopted.

Crystal Falls, Mich.—Commission government won one of the hardest fought battles over the issue that has ever occurred in the upper peninsula when Crystal Falls voted, by a majority of 43, to adopt a commission charter prepared recently by a charter board. The charter was passed despite the efforts of representatives of the mining interests, who set out to beat it, and who were very active in opposition to it. Arrayed against these interests were the business men of Crystal Falls and many of the professional men.

Court Upholds Special Tax District for Civic Center.

Denver, Colo.—The last word in the controversy over the civic center assessments has been given by the supreme court. The decision upholds the city's action in assessing the costs against the taxpayers in the East Denver Park district. Petition for rehearing was denied those who sought to reopen the entire case on the proposition that the Londoner case, decided by the United States supreme court, did not determine the issues involved in the civic center suit. The opinion of the Colo-

rado court was handed down in January, upholding the lower court's decision that the entire city should not be subject to taxation for the civic center. Since then complainants filed an application for rehearing, which is now denied.

City Gives Up Commission Plan.

Janesville, Wis.—Another Wisconsin city has tired of the commission form of government, Janesville having voted to return to the aldermanic system of municipal government. The majority was 350.

TRAFFIC AND TRANSPORTATION

Municipally-Owned Street Railway Successful.

Lincoln, Ill.—City clerk H. C. Mathein, Jr., reports that the service on the electric railway taken over by the city last summer has been greatly improved and the patronage has been good. A profit has been shown each month under the method of accounting prescribed by the Interstate Commerce Commission. There is still a balance in the bond fund and a considerable balance in the operating fund. The property consists of about 8 miles of road serving 10,000 people. At the election held on June 19, 1917, the voters favored by a vote of ten to one to authorize a bond issue of \$30,000 for the purchase of the line. During its twenty-five years' of operation the railway changed ownership a number of times. Because of the problem of paving its right-of-way several owners contended that it was a losing proposition. The last owner had a heating franchise, but allowed his contracts for heating public buildings to lapse and in the winter of 1916 he shut down the plant, discontinuing both heating and railway service. Many attempts were made to sell the plant and railway, but no buyer could be found. After the property had been idle several months, the Lincoln Commercial Club, the merchants of the city and the city officials, after a strong campaign, convinced the people that municipal ownership was the only means of keeping the railway in operation. The sum of \$11,500 was paid for the plant, equipment and rolling stock, much of which was little more than junk, and \$1,650 was paid the owners of the extension line for their track to the cemeteries and to Chautauqua Park. The mayor took control of the management and operation of the system, and the auditing, accounting, etc., is done by the city clerk. Three used cars, in very good condition, were purchased, and the plant and tracks put in running condition. After about a month, it was found that the manufacture of power with the old machinery was very expensive and it was decided to dismantle and discontinue the operation of the plant. Power was purchased from the Illinois Traction System for a period of about two and one-half months when a contract was entered into with the Lincoln Water & Light Company, a privately-owned local corporation, for power for a period of ten years at a much lower rate than it could be generated by the city itself or purchased by it elsewhere.

City to Appeal 6-Cent Fare Decision.

Portland, Ore.—Portland will for the present continue to pay a six-cent fare. The six circuit judges of the Multnomah county courts have held that the act of the state public service commission in granting the Portland Railway, Light & Power company an increase of fare was legal. That the city is created by the state just as the state is created by the federal government and that the city has no right now to overrule the public service commission is in effect a summary of the decision. The city commissioners have directed immediate steps to appeal from this decision to the state supreme court. The decision makes it plain that none of the judges attempted to go into the justice or reasonableness of the six-cent fare as viewed from a common or public viewpoint, the law alone being the basis of the decision. The law enacted by the legislature and approved by the people creating the public service commission gives the commission full power over the street railway fare question

and all other questions of a public utility nature, the judges find. The judges agree that the people erred in granting the railway company its original franchise bare of a stipulation that did not say what should be the maximum fare to be charged by the corporation. The decision said:

"Under charter provisions the city granted franchises. They were duly accepted by the grantees in writing. Each franchise contained a provision, in substantially identical terms, that the grantee could charge and collect the sum of 5 cents and no more for each passage in one general direction. Provision for the regulation of fares by the council was omitted from practically all of the franchises. Did this delegation of power enable the city to bind the state to a rate of 5 cents—neither more nor less—during the entire life of the franchise? Did the state by this delegation surrender its power of regulation? The delegation to grant franchises is in general terms. It contains no provision regarding rates. The only reference to rates is in section 112, and that section contains no words of grant, but provides that every franchise shall contain a provision fixing the maximum fare to be charged. The provision of section 112 relating to fares is a direction that the city must insert in every such franchise the maximum rate of fare that can be charged by the grantee during the life of the franchise. This is not a grant of power to fix an unalterable rate, as against the state, but is a limitation on the power of the city to grant franchises without fixing the maximum rates of fares therein.

"Section 2207, Lord's Oregon laws, prohibits under penalties any street railway company in cities having a population of more than 50,000 inhabitants from charging a fare of more than five cents for any one continuous passage in any one general direction within the corporate limits. This law, general in terms but local in operation, was enacted in 1901. We are of the opinion that this law has been repealed by necessary implication by the public service law. We have already shown that the public service act amended or superseded all municipal charters of the state in conflict with its provisions. It is a well-recognized rule that a comprehensive later statute repeals a prior statute where they are in conflict, or where a general later act includes the entire law on the subject on which the prior act covered only a part. It certainly appears that the public service act embraces the whole subject of rates for public service, and that it was the plain purpose of the framers to give expression to the whole law therein. The two acts cannot be harmonized, the repugnancy is clear, and the prior statute was repealed by necessary implication.

"The public utility act went into effect when it was approved by the people under the referendum of November 5, 1912. It was proclaimed by the governor November 29, 1912. The charter amendments in question were submitted to the people for adoption at the election of May 3, 1913. So the public utility law was in effect when these amendments were submitted and adopted. If these regulations are in conflict with the provisions of the public utility law, they fail, and if they do not conflict they are immaterial in this controversy. Judge Bean has held that these very amendments were invalid, in view of the public utility act in force when they were adopted. In holding them invalid he used this language: 'It is clear, therefore, that both cannot stand. One or the other must give way. There cannot be two public bodies existing at the same time with original jurisdiction to prescribe and fix the only lawful rates to be charged by a public utility. The public utility act was passed by the legislature and approved by a majority of the people on a referendum vote. It is therefore the expressed will of the sovereign power of the state concerning a subject over which it has jurisdiction, and it cannot be amended or abrogated by the people of a particular or given locality.'

Fare Reduction by City Car Line.

Seattle, Wash.—Councilman Erickson has announced that within two months the fare on the city-owned railway between Third avenue and Pine street and Leary avenue and Market street in Ballard will be reduced to 3 cents. The decision of the council comes in the face of a previously announced fact that the city's municipal railway lines were operated between June 1, 1914, and February 1, 1918, at a loss of about \$150,000. Within two months the city expects to receive half a dozen or more one-man cars, and they will be utilized in the equipment of the 3-cent route which measures a fraction less than 5½ miles. Councilman Erickson points out that the line between Pine street and Market street will relieve the congestion on the system as a whole, and that a ride for 3 cents will attract the patronage of those who now walk a dozen or more blocks rather than pay a 5-cent fare. The municipal railway was operated during the fiscal year 1917 at a net loss to the city of \$34,958, according to the annual report of superintendent of public utilities, A. L. Valentine. The report shows that the loss on Division A was \$26,458 and on Division C \$8,480. Passenger revenue on Division A amounted to \$25,097, and the total revenue obtained from the line was \$28,081. The operating expense for the year was \$54,539, this including an item of \$19,125 as interest on the funded debt. Revenue on Division C amounted to \$24,521, and the operating expense totaled \$33,001.

LEGAL NOTES

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Police Power—Wooden Buildings in Fire Limits.

(Tex. Civ. App.) Ordinance making it unlawful, "except when otherwise ordered by the board of commissioners," to erect wooden buildings within certain limits is valid, and confers power upon commissioners, by issuing building permit, to authorize building of wooden structure within limits specified.—Focke, Wilkens & Lange v. Heffron, 197 S. W. 1027.

Police Power—Sand Pit in City.

(Iowa) In suit to enjoin operation of sand pit within plaintiff town as a nuisance, held that part of decree enjoining violation of ordinance with reference to digging of any pit, etc., will be reversed, ordinance being arbitrary.—City of Hawarden v. Betz, 164 N. W. 775.

Negligence in Collection and Paying Funds—Defense.

(Or.) Action against a city for negligence in collecting and paying out special paving fund, from which plaintiff was to receive payment, cannot be defeated on ground that charter indebtedness limitation forbade incurring indebtedness for plaintiff's payment.—Morris v. City of Sheridan, 167 P. 593.

High Tension Wires—Damages—Action.

Georgia.—Action by landowner for damages from unauthorized maintenance of high tension wires over his lands, with prayer for damages and the abatement of nuisance by removal of wires from his property, is not an equitable action within Civ. Code 1910, § 5499.—Fuller v. Georgia Ry. & Power Co., 94 S. E. 249.

Assigned Contract—Paving—Appropriation of Material.

California.—Assignee of contract for street paving might waive contractor's wrongful appropriation of material along the street purchased of contractor by the assignee, and claim its value as under an implied contract therefor.—Hoare v. Glann, 168 P. 346.

Excavation—Sinking of Structures.

Iowa.—One can excavate as long as the soil of an adjoining landowner would not sink away of its own weight, and no liability is incurred if it sinks by reason of structures thereon.—Starett v. Baudler, 165 N. W. 216.

Excavation—Protection of Adjoining Structures.

New York Sup.—Contractors and subcontractors employed to make excavation held not liable for failure to comply with New York Building Code, § 22, as to protecting adjoining walls or structures.—Gordon v. Hedden Const. Co., 167 N. Y. S. 584.

New York Sup.—New York City Building Code, § 22, requiring persons making an excavation to preserve adjoining or contiguous walls or structures, held to include walls or structures near or close to the excavation, though not touching it.—Gordon v. Automobile Club of America, 167 N. Y. S. 585.

Where defendant made excavation on land of B., between land of defendant and plaintiff, in protecting B.'s building from an excavation on its own land, held, New York City Building Code, § 22, required it to protect plaintiff's building.—Id.

New York Sup.—Any person, having a special interest in observance of duty imposed on persons making excavation to protect adjoining walls by New York City Building Code, § 22, held entitled to sue for damages sustained by its violation.—Gordon v. Automobile Club of America, 167 N. Y. S. 585.

County Clerk—Additional Compensation.

Virginia.—County clerk was not entitled to interest on unpaid balances of salary and stationery allowances.—Board of Sup'rs of Culpeper County v. Coons, 94 S. E. 201.

Under Acts 1891-92, c. 477, held clerk of court was not entitled to compensation in addition to salary for indexing deeds, etc., docketed in his office during his term pursuant to court order requiring more extensive system.—Id.

That court allowed and board of supervisors approved payment of similar claims would be immaterial in determining whether county clerk's claim for compensation in addition to salary was properly refused.—Id.

Contract—Improper Influence on Official.

West Virginia.—If the performance of the obligation of a contract furnishes temptation to use improper influence with a public official, the contract is illegal, and no right or obligation can be founded upon it.—Kaufman v. Catzen, 94 S. E. 388.

Bridge Repairs—Adjoining Towns.

Minnesota.—Contract between adjoining towns to jointly repair bridge on road between them, held valid under Gen. St. 1894, § 1824, notwithstanding bridge was on part of highway wholly within plaintiff town, that town line was also county line, and that contract was silent as to its duration.—Town of Mt. Pleasant v. Town of Florence, 165 N. W. 126.

Contract—Uncertain Language—Construction.

Oklahoma.—Where language of a contract is uncertain and parties by their acts construe it alike, and within purview of construction permitted as best by such language, courts will ordinarily follow such adopted construction.—Board of Com'rs of Pottawatomie County v. Henderson, 168 P. 1007.

Crossing Power Wires—Care.

Kansas.—Where street railroad wires, electric light, telephone, and telegraph wires cross each other, those maintaining them must use highest degree of care commensurate with danger by using such appliances as are practicable to prevent contact of wires if any should break or fall.—Lewis v. Harvey, 168 P. 856.

Elections—Closing of Polls—Booths.

Oregon.—Law requiring polls to be kept open to 8 p. m. is only directory and avails nothing in absence of showing that electors were deprived of right to vote, and that number excluded was sufficient to change result.—Links v. Anderson, 168 P. 605.

That there were no booths at polls is not ground for contest of election, under Laws 1911, relating to irrigation districts, in absence of showing of intimidation or failure to cast free ballot.

Electric Plant—Lighting Service.

Under its charter, held, that an electric light and power company could not, under a private grant, provide street lighting service and supply current for private consumption in a town without consent of the town board.—People ex rel. Oneonta Light & Power Co. v. Public Service Commission, Second Dist., 167 N. Y. S. 486.

In view of Public Service Commissions Law, § 2, subd. 12, defining the term "electric plant," an electric company, attempting under private grant to dispose of current to private consumers, is "beginning construction of an electric plant," within section 68, giving the Commission authority to supervise construction.—Id.

New York Sup.—Although an electric light and power company had a private grant of way to construct its lines, the Public Service Commission, under the Public Service Commissions Law, § 68, requiring the consent of the Commission to construction work, had the power to supervise the construction of its lines.—People ex rel. Oneonta Light & Power Co. v. Public Service Commission, Second Dist., 167 N. Y. S. 486.

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d street, New York, N. Y.

March 27-28.—INDIANA SANITARY AND WATER SUPPLY ASSOCIATION. Annual convention Claypool Hotel, Indianapolis. Secretary, W. G. Ulrich, Indianapolis Water Company.

April 15, 16.—SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION. Annual convention, Galveston, Tex. Secretary, H. S. Cooper, Dallas, Tex.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-20.—SOUTHWESTERN SOCIETY OF ENGINEERS. Annual convention, Douglas, Bisbee and Tucson, Ariz. Secretary, C. E. Barglebaugh, El Paso, Tex.

April 23-26.—SOUTHWESTERN WATER WORKS ASSOCIATION. Seventh annual convention, Tulsa, Okla. Secretary-treasurer, E. L. Fulkerson, Waco, Tex.

May 13-17.—AMERICAN WATER WORKS ASSOCIATION. Annual convention, St. Louis, Mo. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

May 21-23.—ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS. Annual convention, Hot Springs, Ark.

Vermont Society of Engineers.

More than fifty members of the Vermont Society of Engineers held their sixth annual business meeting and banquet in Burlington March 13.

At the opening session in the morning there was an election of officers and committee reports were read. The officers chosen were: President, B. M. Hayward of Montpelier, research engineer of the Central Vermont railway valuation department; vice-president, J. W. Votey, of Burlington, dean of the college of engineering at the University of Vermont; vice-president (elected last year for two years), C. F. Purington, of Burlington, manager of the Leader Evaporator company; secretary, G. A. Reed, of Montpelier, assistant state engineer; treasurer, L. E. Dix, of Northfield, professor of civil engineering at Norwich University; directors, C. A. Slayton, of Morrisville, superintendent of Morrisville Electric company; directors (elected last year for two years), F. W. Denison, of St. Albans, assistant engineer of the Central Vermont railway; E. D. Blackwell, of Brandon, electrical engineer.

The committee on public policy urged better delivery from various railroad terminals of the state. The committee on roads and pavements and their development in Vermont strongly advocated the rebuilding of the highways of the state in view of the military needs. Prof. F. E. Austin, of Hanover, N. H., spoke on the electrification of railroads. H. D. Larrabee, of the Tenney Electrical company at Montpelier,

read a paper on "Power Development in Vermont." For the committee on railroads and structural engineering, F. R. Stevens of the valuation department of the Rutland railroad, spoke on "Valuation Work." Prof. L. E. Dix, of Northfield, reported for the committee on sanitation and public health, taking as his subject "Sewage Purification by Electricity."

A most interesting address was given at the afternoon session by Capt. G. L. Byrode, professor of military science and tactics at Norwich University, his subject being "To the Trenches and Back in Less Than an Hour."

"Modern Fireproof Buildings" was the subject of an address at the evening session by Charles H. Nichols of New York, in a lecture hall at the University of Vermont. His lecture was illustrated with views of constructional works, drawings of buildings already erected and to be erected soon.

A. E. Winslow, the retiring president, gave his annual address, taking for his subject "The Engineer of To-day," following the lecture by Mr. Nichols, and this lecture closed the session.

A banquet was held at the Hotel Vermont at 6:30, just preceding the evening session.

International Fire Fighters' Union.

At a recent convention held in Washington, D. C., the International Fire Fighters' Union was founded and organized.

"The object of our new organization

is not to stir up agitation or factional feeling, but to strive for the betterment of our working conditions and the improvement of the service," according to a statement by one official. "Strikes are unconstitutional under the constitution adopted. Formerly we operated as local unions under the federation plan; now we have our own international organization with headquarters at Washington, D. C. Later we will work out the matter of insurance and sick benefits in our order in the same manner that the other big brotherhoods of national importance are conducted."

The country was divided into 12 districts, from each of which a vice-president was elected. These vice-presidents are the board of directors of the international. Thomas Spellacy of Schenectady, N. Y., was elected president. W. A. Smith, of Washington, D. C., was elected secretary.

The convention selected Colorado Springs as the place for the next annual convention, the second Monday of September, 1919.

Texas Members American Society of Civil Engineers.

Dallas was selected as the future headquarters of the Texas Association of Members of the American Society of Civil Engineers at its recent annual meeting held at the University Club. It was decided that the activities of the association should continue during the war, and annual meetings will be held here until otherwise ordered by the board of directors.

The following officers for 1918 were elected: R. C. Gowdy, of Fort Worth,

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PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Cresbard, S. D., is to build WATERWORKS. The engineering firm of Smith & Loomer is in consultation on the improvement.

SEWERS and a DISPOSAL PLANT are to be built by Sun Prairie, Wis. The consulting engineering firm of Reichardt & Pierce prepared plans.

Montezuma, Ia., is to construct an outlet SEWER and SEWAGE TREATMENT PLANT. Plans and specifications for the improvement were prepared by John H. Dunlap.

A SEWAGE DISPOSAL PLANT and SANITARY SEWERS are to be built by Lebanon, Pa. The designing and consulting engineer for the work is James H. Fuertes.

The Muscatine Island Levee District, Muscatine, Ia., is receiving bids for extensive LEVEE construction. Plans and specifications for the work were prepared by the firm of Elliott & Harman.

Construction of WATER MAINS is proposed for the town of Bellingham, Mass. The engineer for the work is Willard Kent.

Lebanon, O., is to build a SEWAGE DISPOSAL PLANT. Plans for the work have been completed by the engineer, Robert E. Kline.

Beaver County, Beaver, Pa., is to make BRIDGE REPAIRS according to plans prepared by the Farris Engineering Co.

Improvements are being considered for the ELECTRIC LIGHT PLANT and WATERWORKS of Shattuck, Okla. Preliminary plans are in the hands of Burns & McDonnell.

Norfolk, Va., is considering the purchase of the local property of the Norfolk County Water Co. W. E. Chester has been retained as consulting engineer to investigate the WATER situation and make a VALUATION of the plant.

INDUSTRIAL NEWS

Cast Iron Pipe.—Government prices remain constant, but there is a tendency to cut about \$2 a ton on 6-inch and \$1.50 on 4-inch where business is competitive. Quotations: Chicago, 4-inch, class B and heavier, \$57.30; 6-inch, \$54.30. New York, 4-inch, class B and heavier, \$58.35; 6-inch, \$55.35; 3-inch, \$65.35. Birmingham, 4-inch, class B and heavier, \$52; 6-inch, \$49; class A, \$1 extra.

The advertising department of **The Harrison Works**, owned and operated by **E. I. du Pont de Nemours & Co.**, located at Wilmington, Del., is sending out to the trade a series of twelve handsomely illustrated calendar-blotters. Each blotter in the series makes paint-creating thought for the consumer or property owner, and shows pictures of houses, rooms, floors or automobiles which have received proper painting and are, accordingly, very attractive. The edition of these blotters runs close to the million mark, the art-work is high grade and the printing is four-color process. One of the important side-issues is the education of the dealer to the idea of driving hard for increased paint sales every month in the year, and not in seasons only.

Construction Work in Belfast, Ireland.—According to consular reports, one of the most perplexing questions with which the corporation has ever had to deal is that relating to the disposal of sewage. The foreshore nuisance, of which complaints come from the residents on the County Down shores of Belfast Lough, causes great anxiety. The new ferroconcrete outlet sewer, which was commenced in 1913, is not yet finished. The work of constructing new sewers and renewing old ones which have become defective involves annual expenditures by the city corporation.

Improvements relating to the widening, straightening, or extending of streets are always in progress here. The surface of the streets is being gradually improved, and it is noticed that the "kidney" pavers are disappearing, and material more conducive to the comfort of the community is being substituted. Wood blocks or tarred macadam is being used for the making of roads near schools and churches, in order to deaden the sound caused by heavy traffic. Street works under the Belfast corporation act of 1911 cost \$347,531; improvements under the Belfast improvement order of 1910, \$577,327. These schemes are still in progress.

The question of making provision to meet the rapidly expanding business of the electricity department has been considered by the corporation since early in 1911. The proposed building of additional electrical works to supplement those now existing has received very close attention. The de-

cision to proceed with the new works was unfortunately rendered impracticable for financial reasons by the war.

A new water supply system is partly constructed, but on account of the conditions nothing is being done at present. The new works when completed will serve about 800,000 persons. The outlay at present is \$10,321,997. An additional sum of \$2,433,250 or thereabouts will be required to complete the plant.

Notice has been given that application will be made to Parliament by the Belfast harbor commissioners for leave to bring in a bill and pass an act for the construction of new works to improve the harbor at Belfast. The principal feature of the scheme is the proposed construction is a series of docks. An important part is that relating to the deepening and extension, by excavation, dredging, or otherwise, of the canal for navigation. It is proposed to construct wharves, jetties, and quays, and, with a view to meeting the requirements of future developments in the shipping industry, the construction of a new loading dock. If the scheme were carried out in its entirety an expenditure of more than \$9,733,000, it is stated, would be involved; but there will be a marked fluctuation in the cost of labor and materials after the war, and any estimate which might be given now would be largely speculative.

[A list of engineers, builders, mill companies, and officials in charge of public works in the Belfast district may be obtained from the Bureau of Foreign and Domestic Commerce, its district or cooperative offices. Refer to file No. 95503.]

Auto Trade Reduces Production 30 Per Cent.

A curtailment of 30 per cent in automobile production for the present year is the latest important action taken by the members of the National Automobile Chamber of Commerce. Many of the large plants have already curtailed their production of motor vehicles to a larger extent, in view of taking over the munitions work for the Government. Hugh Chalmers, vice-president of the National Chamber, states that the voluntary 30 per cent curtailment is entirely satisfactory to the War Industries Board and the Fuel Administrator. The National Automobile Chamber of Commerce is composed of 117 motor manufacturers, and nearly all of the large plants were represented at the meeting. It was voted at the recent meeting to dissolve the Automobile Industries Committee and to maintain in its stead a general headquarters in Washington in charge of Hugh Chalmers. Mr. Chalmers was a member of the former committee, which was formed last November to assist the War Industries Board in the selection of factories best adapted to the making of various forms of war munitions while maintaining the efficiency of the plants for the necessary motor requirements of the country. A staff of engineers will be kept at the

national automobile headquarters to aid manufacturers in their work for the Government.

NEWS OF THE SOCIETIES

(Continued from page 253.)

president; R. J. Potts, of Waco, first vice-president; Hans Helland, of San Antonio, second vice-president; J. H. Brillhart, of Dallas, secretary and treasurer. These officers, together with the retiring president, J. M. Lowe, and C. H. Chamberlin, of Dallas, constitute the board of directors. Professor R. G. Tyler, of the University of Texas, read a paper on "Purification of Sewage by Aeration in the Presence of Activated Sludge." J. C. Nagle, dean of the school of engineering of the A. & M. College, reported on and read some literature bearing on proper legislation for licensing engineers for the protection of the profession and the public. Major Rothrock of the Quartermaster Department of the Army, who was present as a visitor, entertained the meeting with a history of the rapid and efficient work done in constructing the cantonment at Camp Logan, Houston, and Terrell Bartlett read a paper on the relation of rainfall to run-off.

Flint Municipal Engineering Society.

At a recent meeting the Municipal Engineering Society of Flint, Mich., elected E. C. Shoecraft president and Robert Knapman secretary. The society's membership is made up of men in the department of engineering of the city.

PERSONALS

Bascom, Harry F., is now city engineer of Allentown, Pa.

Goss, W. R., has resigned as superintendent of the water and sewer system of Shreveport, La.

Smith, John H., resigned as head of the state engineering department of Idaho.

Solomon, Gabriel, of the consulting engineering firm of Solomon-Norcross Co., Atlanta, Ga., has been commissioned major in the Engineer Reserve Corps and assigned to the engineering staff of the cantonment division. Mr. Norcross is supervising engineer at Camp Humphreys, Belvoir, Va. The firm of Solomon-Norcross Co. has been engaged in cantonment work for the Government on a number of camps in the South and West. The general practice of the firm will be continued as heretofore with headquarters in Atlanta.

Tolman, Mayo, chief engineer of the West Virginia department of health, has gone to Guatemala for three months for American Red Cross. He will engage in relief work made necessary by the recent earthquake. Mr. Tolman has not resigned his state position but has received a three months' leave of absence.